MEDICAL TREATMENT

PRINCIPLES AND THEIR APPLICATION

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MEDICAL TREATMENT

PRINCIPLES AND THEIR APPLICATION

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TABLE OF CONTENTS

PREFACE

THE general object of this work is to reflect the present-day outlook on medical practice and to make generally known the detail of the treatment of sick persons and their diseases as practised by the contributors to the book.

Although medicine and surgery overlap to such an extent that some surgeons have the knowledge and understanding of a good physician, and some physicians have proved themselves competent surgeons in emergency and in time of war, nevertheless a distinction can be made between medical and surgical practice In this book treatment which involves the use of a syringe and needle is included in medical practice, whereas any treatment which involves the use of a knife is either excluded or, where mentioned, is discussed without the detailed description of the surgical text-books thus the treatment of varicose veins by sclerosing injections has been included as part of medical treatment, but treatment by excision and ligation is omitted

During the past 50 years the field of medical practice has widened, first by an increasing interest in the prevention of disease and more recently by definite steps to promote health In *Medical Treatment* the articles reflect these present day trends [illegible]

[illegible]

A separate article on breast and artificial feeding of healthy infants belongs to the same subject An article on rehabilitation gives in outline some of the measures [illegible]

[illegible] tions that deal with the treatment of disease there are paragraphs which describe means of improving health, as for instance the treatment of mouth-breathers Again, the treatment of patients with epilepsy and with paraplegia is dealt with from the point of view of restoring them to the maximal working capacity compatible with their disease Another new principle is being established in the treatment of disease for whereas in the past the importance of rest was emphasized, we now recognize the harmful effects of continued rest in bed and the beneficial effects of activity Modern treatment, therefore, encourages as much activity as the patient's illness allows, this leads to a shorter convalescence and a quicker return to full activity

[illegible]

[illegible]

scientific knowledge, a number of new and effective means for the treatment of disease are being made available to doctors—one might almost say every few months If has become necessary therefore to review therapeutic measures in general terms in order that medical practitioners may be supplied with a knowledge of the basic principles involved in the use of new items of treatment supplied to them This kind of knowledge is provided in the articles on nuclear physics, chemotherapy of cancer, x-ray and radium treatment, sulphonamides, antibiotics, and the physical methods of treatment in psychiatry A caution as to the use of drugs is conveyed in an article on drug intolerance and idiosyncrasy

With the growing application of physiological and physio-pathological principles to the treatment of ill persons, symptomatic treatment assumes greater importance This is recognized in the articles on dehydration and blood transfusion, as well as in the articles on the treatment of common symptoms such as backache, headache, vertigo, cough, constipation and flatulence

After considerable thought it was decided to adhere to an alphabetical classification both for the subjects and within the framework of each subject heading In [illegible]

vantages outweigh its disadvantages, especially in facilitating reference for the busy practitioner

Whereas this book has among its objectives the presentation of general principles which will serve as a guide to practitioners in their choice of treatment, every effort has been made, where possible, to give a detailed plan of treatment for each disease or condition dealt with in the text

GEOFFREY EVANS

September, 1950

ADDICTION

ALCOHOL ADDICTION

Alcoholism is the commonest of all the addictions and a frequent symptom of many abnormal mental states It quite often occurs in the earliest stages of the dementias of general paralysis and cerebral arteriosclerosis, sometimes in schizophrenia and in both phases of the manic depressive psychoses Indeed, every case

certain instability of mind is found in most alcoholics though, indeed, every type of mentality is liable to be affected The influence of heredity is of definite significance

TYPES OF ALCOHOLIC ADDICTION

The types of alcoholism may be classified as follows

PSEUDO-DIPSOMANIA

Pseudo dipsomania, perhaps better named true alcoholism, is by far the commonest of the alcoholic categories The patient, after months or years of excess, often quite suddenly finds that his tolerance of alcohol has disappeared, and that a given quantity of it affects him far more quickly and more profoundly than ever before Moderate drinking indeed, has become impossible—a single drink leading inevitably to debauch It is essential to realize that in pseudo-dipsomania some irreversible chemical change, of which we know nothing but its effects, has occurred, and that in future complete abstinence is the alternative to a life of drunkenness and deterioration

CHRONIC ALCOHOLISM

Chronic alcoholism is commonly divided into (a) the sober type in which the patient is rarely if ever intoxicated and (b) the inebriate type in which some degree of intoxication is the normal condition In this group, tolerance is very high

TRUE DIPSOMANIA

True dipsomania is regarded as a periodic psychosis, the most striking symptom of which is an overpowering desire for alcohol It occurs in moderate drinkers and teetotallers and cannot rightly be called an addiction

TREATMENT

Up to the earlier part of the present century the routine treatment for alcoholism consisted in little more than the confinement of the patient willing or unwilling within an institution where access to his drug was impossible Here he stayed for several years, almost invariably returning to his old habits as soon as he was released Nowadays however, it is realized that success depends on the patient's willing co operation without which treatment is useless Each patient needs to be

re-orientated, and re-educated in his outlook towards alcohol. For this purpose it is

always be afforded when numbers are large.

Withdrawal is a simple matter and can readily be effected by the use of drugs of the belladonna group, indeed, it is remarkable how readily with such aid the most inveterate drinker will submit to separation from his alcohol. It may be helpful to describe the general lines on which this sort of medication is applied in a typical case.

TREATMENT OF A TYPICAL CASE

history will probably prove that for years he has been accustomed to drink heavily at times, but that in the last few years his control of himself has been rapidly

morrow of an alcoholic bout.

The *patient* is *put to bed, and examined* for any *organic* disease which might contra-indicate the belladonna treatment or suggest its postponement; marked chronic bronchitis or a history of glaucoma would call for caution. In the first 24 hours he will receive rather less than his usual allowance of alcohol; 5–8 minims of tincture of belladonna in water is administered every 2 hours.

down, but generally a 2-hourly dose of 20–25 minims is reached within a week. Alcohol is reduced at first
7 or 10 days. The patient
alcohol and finally he ma
patients, however, are nervous of taking the drink which is to be their last, and these will need encouragement and persuasion.

When withdrawal has been conducted in this manner, the patient will almost always find that the craving has disappeared; alcohol has become as little attractive

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reliminary
itinues for
nauseous
alcohol, till the sight and smell of it becomes disgusting.

Antabuse

Mention should be made of the treatment of alcoholism by tetraethyl thiuramdisulphide (Antabuse), which is based upon the finding that this drug renders the individual peculiarly sensitive to alcohol, so that the ingestion of quite small amounts of the latter produces considerable distress and discomfort. When Antabuse is used for therapeutic purposes the alcoholic patient is provided with a [illegible]

intervals

The Antabuse treatment is a new departure The results seem promising, but how far they are permanent remains to be seen It must certainly be used with caution because serious side-effects have been reported which include mania and convulsions in two or three cases (Jacobsen and Martensen Larsen, 1949)

Importance of Co-operation

Whatever method is used to produce either dislike or indifference to alcohol, future safety depends on how completely the patient is compelled to realize the facts of his condition It must from the first, be made abundantly clear that moderate drinking will for ever be impossible, he has the choice between teetotalism and the life of a drunkard for a change has occurred in his body chemistry which makes the mere tasting of alcohol an occasion for certain debauch He should be made to recall his countless past failures to drink in moderation, and eventually he may be induced to see that the first drink is always the prelude to disaster He will need to have it repeated again and again that, when a man has lost tolerance to alcohol no exercise of will power is of the slightest avail

The foregoing principles of treatment apply particularly to pseudo-dipsomania in which, as has been insisted, the loss of tolerance means that complete abstinence must in future be observed, but they hardly need alteration when the case of the [illegible]

to excess if he tries to drink in moderation

While the imperative need of teetotalism in the future is the central fact that the now abstinent alcoholic has to learn there will be much that will need full and detailed consideration There will be contributory causes of his addiction, such as excessive shyness the belief that his business will suffer if he does not drink with customers, his life may be lonely and ill regulated in regard to proper relaxation, [illegible]

it must be put in some sort of order

The physician will do little if he cannot command respect and regard, for it is largely on his influence that the whole future of the patient will depend He need not be an accomplished psychologist to get results, but he must exercise endless patience and must not take too heavily the disappointments he will meet. There are cases, of course, which will need thorough psychological analysis, but for the most

world that is ignorant of his special difficulties, and he will meet acquaintances accustomed to drink in moderation who will expect him to share their pleasure There will be moments when fatigue or disappointment suggest the fatal single drink *or when some cheerful occasion calls for celebration If he is left entirely* alone the time will come when he begins to question his need for abstinence, and to debate whether his obvious physical and mental improvement does not justify an experiment in moderate drinking *The human being finds it easy to forget his mis-*takes and the penalties of those mistakes, and the memory of the recovered alcoholic is particularly defective in this respect Occasional contact with his physician renews his sense of effort and keeps fresh in his mind the facts which alone can lead to his final restoration Moreover, though his health will be greatly improved, he must be forewarned that for some months he will be liable to small maladies—

for the next alcoholic phase The patient's relatives should be instructed to report preliminary symptoms and to urge him to take treatment before the bout develops *for, however much this necessity is demonstrated* to the patient in his intervals of normality, he will rarely act on such advice when mental disquiet warns him of imminent danger

In pseudo-dipsomania the patient can never be persuaded to seek medical aid in the early stages of a relapse, and relapse is unfortunately frequent He must be left to his own devices for a while, and will only return for help when his need is obvious even to himself

Jacobsen, E. and Martensen Larsen, O (1949) *J Amer med Ass*, 139, 918

DRUG ADDICTION

Addiction to drugs denotes their constant and habitual use for purposes which cannot be called legitimate for the pleasure they produce or for the assuagement of disagreeable sensation of every kind Such regular ingestion of a drug increases the power of the body to deal with it, *so that ever larger amounts become* necessary to secure its original effect, at the same time there develops a physical compulsion to [illegible] when it is withheld Tolerance

[illegible] ives morphine, [illegible] aldehyde, ether, [illegible] r, for any drug [illegible] if the compara-tively harmless tobacco is excepted, by far the com[illegible]g of addiction indeed its problems are so varied and manifold that it is considered separately

THE MORPHINE GROUP

[illegible]

than is absolutely necessary, but he will recall instances of a small unchanging dose of codeine, and even of laudanum, being taken for considerable periods without habit being formed That does not alter the fact, however, that the prolonged

new sensation, but the majority of addicts in Great Britain owe their habituation to the necessity of continuing their work in the face of chronic and painful ailments, such as sciatica, peptic ulceration and migraine Whatever the original cause of their addiction, probably most addicts were always morbidly sensitive to pain,

TREATMENT

Treatment is not always necessary or to be desired In the case of the old and infirm, for example, who have not exceeded their ration perhaps for many years, it may not be wise to remove their drug, but with younger persons the eventual outlook is so disastrous that every effort should be made to press for treatment Before active steps are taken it is essential to deal adequately with any cause of physical pain which may have started the habituation, for if pain is allowed to persist no good result can come When this is done, treatment consists in removing the drug with as little physical suffering as possible, repairing the general health, and in raising morale by encouragement and psychological discussion Some sort of after care, generally extending over a long period, is indispensable

Withdrawal of the drug

procedure The process is best timed to last two or three weeks, but before it is started the patient's comfort and kindly invigilation must be secured Treatment must *never* under any circumstances be given in the patient's home but in a hospital or nursing home, his attendants having experience of psychological work. The addict is very expert in his side of the problem and will soon detect carelessness or

danger of distress increasing as zero is approached

Various methods are employed to mitigate what would otherwise prove an almost unbearable ordeal The effective use of any one of these methods largely depends on considerable experience and a detailed knowledge of its application The Lambert method, of which the author has had long experience, has the advantage of simplicity Originally, Lambert used a belladonna mixture consisting of 2 parts of a 15 per cent tincture of belladonna and one part each of the fluid

extract of hyoscyamus and xanthoxylum Tolerance of this mixture differs widely, 5 or 6 drops per hour being an average initial dose, and the amount given is gradually increased until the limit of tolerance is reached Concurrently with this treatment very drastic purgation is employed Four or five doses of morphine, in rapidly descending amounts, are given at more or less 12 hourly intervals

The author has worked out and used for many years a modification of Lambert's method which takes rather longer but is much less drastic Equal parts of tincture of belladonna and liquid extract of hyoscyamus are employed, and 3–5 drops of this mixture, in water, are administered every hour if the patient is not asleep Dosage is steadily increased, but so slowly that some dryness of the mouth alone is produced—dilatation of the pupils being avoided Patients differ widely in their power to tolerate drugs of the belladonna group, but it is common to find that 15–20 drops every hour can be well borne towards the end of active medication No purgation is needed

Reduction of the morphine or heroin proceeds *pari passu* with the increase in belladonna dosage, no fixed rules being applicable to the rapidity of withdrawal in any particular case At first, reduction by ½ grain a day will not be noticed, but as smaller doses are reached the process must be more cautious and gradual Thus after the first week the daily intake may be 1 grain of morphine instead of 4 grains,

Post-withdrawal measures

After withdrawal there will ensue a period of depression lasting several days which is often succeeded by a phase of inordinate cheerfulness Colour clears, appetite becomes voracious and the patient will believe that all taste for his drug has disappeared, here caution is necessary *His nervous system is extremely unstable and his tolerance of physical exercise very low indeed* For a week any serious mental or physical activity must be forbidden—indeed if at the end of a month of treatment the patient can take two half mile walks a day without fatigue, *he will have done very well*

During this period of cautiously increased activity there is much to be seen to in

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CONVALESCENCE AND AFTER CARE

After 4 or 5 weeks, some sort of holiday is needed and can generally be taken without the invigilation of an attendant, though the presence of a responsible relative is desirable The patient should have learnt that his activities must be only gradually increased and it is well that he should have exact directions to guide him

On his return to normal life, the recovered addict must keep in close touch with his physician and report at intervals, for he will need psychological help and encouragement How far formal psychotherapy is needed depends on the individual patient and the decision depends on his mental make-up and history

PROGNOSIS

Whatever skill and experience is expended on these cases the final result is often disappointing When there is a marked neurotic or psychotic background success is rare and when the patient has always shown a general failure of adaptation to the difficulties of life, the outlook is poor indeed Fortunately, those who are most worth helping are most often helped

OTHER FORMS OF ADDICTION AND THEIR TREATMENT

PETHIDINE

Pethidine, originally regarded as innocuous and until quite recently unrestricted in its sales, is certainly a cause of serious addiction At one time it was not uncommon to meet patients who were taking large doses, and treatment proved difficult because supplies could be so readily obtained Under the new restrictions such addiction will no doubt become rare, for pethidine offers little initial attraction Separation from the drug and a short course of belladonna medication generally prove successful

COCAINE

Cocainism is extremely rare in Great Britain, indeed, it is hardly ever found except to provide a contrasting sensation to the opiate in persons already addicted to morphine or heroin In such people the secondary habituation seems to lose its grip when the opiate is removed, but, in its pure state, cocainism is the most deadly of all addictions No treatment short of prolonged segregation has any effect, and that is not often permanent

BARBITURATES

Reference [illegible]

sets his mind to it he can manage to [illegible]

whether suicide was intended

Apart from such emergencies, the habit of taking hypnotics in increasing quantity sometimes needs to be broken by supervision and psychological treatment

G. LAUGHTON SCOTT

ALLERGY

HAY FEVER

Hay fever, or pollinosis is a seasonal affliction due to sensitivity to pollens it is characterized by one or more of the following symptoms sneezing attacks coryza or nasal obstruction *and itching of the nose eyes or nasopharynx* In some cases asthma may occur, Grass pollen is the most common sensitizing agent, followed by tree, shrub and flower pollens, in that order

TREATMENT

Treatment aims at prevention of the recurrence of the attacks and the relief of symptoms It is of importance to treat even mild cases of hay fever thoroughly as a *considerable number tend to become asthmatic in later years if neglected*

METHODS OF PREVENTION

The only certain method of prevention is to avoid all contact with the offending [illegible]

DESENSITIZATION

Hay fever, of all the allergic diseases, responds best and most completely to adequate desensitization (hyposensitization) The usual procedure is to skin test the patient against 30–40 of the most likely offenders of grass tree shrub and flower pollens and then make up a desensitizing solution against the pollens to *which he reacts A few allergists believe that there is sufficient cross immunity* between the different pollens so that if only one sufficiently potent pollen Timothy [illegible] then desens[illegible] on to all the other pollens is obtained There [illegible] untreated cases [illegible] Timothy grass [illegible] patients who have had a course of Timothy grass [illegible]llens [illegible]gainst those other pollens

Many patients with hay fever show lesser sensitivity to other inhalants such as house dust, feathers and animal hairs If such is the case these allergens are also included in the desensitizing solution and *the methods of avoiding such allergens* as described under Asthma are also advised in detail

For treatment a number of commercial firms in Great Britain have prepared stock mixtures of extracts of the more important pollens Most of them will also prepare specific solutions against any specific pollens required if asked for by the allergist The author has found some of these preparations very reliable

This is not the place for a discussion of the methods of standardization of the extracts and the different units employed by one or other firm. Some are based on the weight of pollen extracted, others on the nitrogen content of the extract and others on comparative skin tests of the new extracts with extracts of known

turer know if the weal reaction to the skin test is especially large, that is greater than the size of a shilling by the scratch method In such a case the manufacturer will usually prepare an extract for the initial doses, more dilute than the standard one The strength of the weakest initial dose should be such as to just fail to cause a definite skin weal on intradermal testing

It is the author's practice, if possible, to carry out sensitization tests on the skin of the patient in December or January and to begin the desensitizing injections as early in the year as possible They are so spaced that the last dose of the 23 injections in the course recommended is given in the last week of May or in the first week of June For a discussion of the technique of injection and the types and treatment of any side-reactions which may occur *see* under Asthma

Pre-seasonal treatment

Skin sensitization tests are carried out at the end of each year, that is 6 months or more after each course of injections is finished, until no positive skin reactions remain It is very gratifying and encouraging to the patient to see the decrease in sensitivity each year as shown by these skin tests Thus if he was sensitive to 30 of the pollens tested before treatment, he would probably be found sensitive to only 10–15 of them 6 months after the first course of treatment, to only 4 or 5 after the second year's treatment, and perhaps to none at all after the third year's treatment

that most commonly used in Great Britain and is very satisfactory. On the records of many thousands of cases the author has found that after 3 years of specific treatment as detailed above, some 10 per cent of patients are completely cured of their hay fever and show no recurrences, 80 per cent are free of symptoms for 1, 2,

Co-seasonal treatment

In some cases co-seasonal treatment is given In this method small doses of pollen extract are given with adrenaline every 3–4 days throughout the pollen

not infrequent.

URTICARIA AND ANGIONEUROTIC OEDEMA

DEFINITION

Urticaria, hives or nettlerash, is an oedematous condition of the skin characterized by the formation of wheals, usually multiple, irregular in size and shape and evanescent in character, and accompanied by an itching, burning or stinging sensation In angioneurotic oedema the loose subcutaneous tissue is also involved by the oedema

TREATMENT

SYMPTOMATIC

Adrenaline hydrochloride 1 1,000, 5–15 minims, injected subcutaneously usually gives immediate but transient relief It may be life saving when oedema of the larynx is present Antihistamine drugs (*see* Hay Fever) are of great value, and 60–80 per cent of patients respond to a greater or less degree When these

squeezed into the bath until the water is opalescent) all may give relief for some

Phenol		5 gr	0 3 g
Menthol		1 gr	0 06 g
Calamine Zinc oxide	equal parts	60 gr	4 0 g
Alcohol, 90%		60 min	4 0 ml
Distilled water, to		1 fl oz.	30 0 ml

Shake well and dab on as needed to relieve the itching

SPECIFIC

Many cases are due to sensitivity to foods and inhalants as described under

also sometimes induce attacks of urticaria The cause determines the treatment Exclusion of sensitizing allergens or, if this is not possible, desensitization as

described on pages 10 and 11 is of great value Any foci of infection in teeth, throat, or other sites should be eliminated

Black in 1945 found that in many cases of urticaria and angioneurotic oedema

meals The author has confirmed the presence of a prolonged prothrombin time in some cases of urticaria, and relief has been obtained after vitamin K therapy, but the percentage of successes has been at a much lower rate

Cuticolour titanium dioxide	28 5
Glycerin	1 5
Vanishing cream	70 0

Urticaria due to cold is rare and is difficult to treat, apart from avoidance of

till a final dose of 1–1 5 millilitres is attained Autodesensitization by increasing contact with decreasing temperatures has been at least temporarily successful The patient immerses his hands in water at 65° F for 1 or 2 minutes twice daily and the temperature of the water is slowly reduced over 3–4 weeks to a minimum of 45° In cases due to heat sensitivity, a similar type of acclimatization to heat may be tried

Miscellaneous Measures

In many cases no cause, except perhaps a psychological one, can be discovered Attempts at non specific desensitization have been pursued with a great variety of substances The theory of the action of the different injection materials is, to say the least obscure and the results, in a condition which not rarely comes and goes are very difficult to evaluate Nevertheless such treatment does appear to have a definite effect in certain cases

Autohaemotherapy

Blood is withdrawn from a vein and injected intramuscularly into the buttock The initial dose is 1 millilitre increasing by 1 millilitre at intervals of 3–7 days till a dose of 10 millilitres is reached Such an ascending dosage is wise, as a large initial dose of blood may rarely precipitate a severe attack of urticaria

Peptone Injections

A 5 per cent solution of Witte's peptone or Armour's Peptone No 2 is used The injections are given subcutaneously beginning with 0 1 millilitre and increasing by 0 1 millilitre at intervals of 3–7 days if no reaction is caused until a dose of 2 millilitres is reached This dose may be continued at weekly intervals for many months,

Calcium gluconate

Calcium by mouth has no effect but intravenous or intramuscular injections of calcium salts, especially calcium gluconate, have a considerable vogue The author's experience with them has been disappointing The dosage is 5–10 millilitres of a 10 per cent solution once or twice a week The solution must not be injected subcutaneously as sloughing may be caused

Hydrochloric acid

Hydrochloric acid given by mouth may benefit some cases of chronic urticaria [illegible]

Dilute hydrochloric acid	30 min	2 ml
Glycerin of pepsin	60 min	4 ml
Syrup of orange	15 min	1 ml
Chloroform water, to	½ fl oz	15 ml

Black, J H (1945) *J Allergy*, 16, 83

VASOMOTOR RHINITIS

Vasomotor rhinitis is a condition characterized by attacks of sneezing rhinorrhoea or nasal obstruction and often loss of the sense of smell Other names for the same condition are perennial hay fever, paroxysmal rhinorrhoea, allergic perennial rhinitis and allergic or atrophic coryza

The causes of this condition and its investigation are the same as those detailed under Asthma Not infrequently in the more chronic cases there may be a superadded bacterial infection, but again it is important to deal with the allergic causes first as then frequently the infection improves of its own accord An uncomplicated case shows a boggy, pale mucous membrane compared with the reddened mucosa of the infective coryza

TREATMENT

The curative treatment consists of avoidance of the sensitizing factors such as dust, feathers and so on, and desensitization against these factors (*see* Asthma)

Palliative treatment includes the use of antihistamine drugs (*see* Hay Fever, page 12) and of vasoconstrictor agents, such as Privine drops, Benzedrine inhalation and ephedrine drops or cream (page 13) These vasoconstrictor agents should be used as little as possible as there is always a secondary vasodilatation as the effect wears off, and the condition thereupon may be worse than before Vasoconstrictors should be used only if the antihistamine drugs are ineffective and should even then be kept for special needs, such as when going to bed or before giving a lecture

Ionization with zinc or other substances, and cauterization of the nose rarely bring relief, in fact many patients are made worse and may develop asthma thereafter With regard to nasal surgery, little relief is likely to be afforded in the absence

there is pronounced deviation causing serious obstruction and predisposing to sinus infection

C J C BRITTON

ANTIBIOTICS AND SULPHONAMIDES

AEROSPORIN

The antibiotic aerosporin, first described by Ainsworth, Brown and Brownlee (1947), is produced by *Bacillus aerosporus*, isolated from the soil Stansly, Shepherd and White (1947), in the United States of America, have described a similar substance produced by a closely related or identical organism, *B polymyxa* Chemically, aerosporin is a basic peptide, purified as the hydrochloride for clinical use, the activity and pharmacology, summarized below, have been described by Brownlee and Bushby (1948)

ACTION

Aerosporin is bactericidal, the killing time varying with the concentration of the drug and the number of organisms Both multiplying and resting bacteria are affected, the action being more rapid and slightly greater in broth or water than in serum In view of the relatively low blood concentrations which are obtainable, it

PHARMACOLOGY

tive organisms

per

of

the

above dosage, the blood level might reach [illegible] to

RESISTANCE

Sensitive organisms may develop resistance to aerosporin but the process is slow and requires many subcultures *in vitro* Such strains remained virulent and were found to resist treatment *in vivo*.

TOXICITY

The lethal dose for mice is, on the average, about 20 milligrams per kilogram An antidiuretic effect was seen in rats receiving 5 milligrams per kilogram but has

not been found in man after therapeutic dosage Unfortunately, the drug affects the renal tubules, sometimes seriously Up to the present this has prevented its general use

TREATMENT

Experimental

Mice infected with *Salmonella typhi*, *Bact coli*, *H pertussis*, *H influenzae* and *H bronchisepticus* were protected by aerosporin but very heavy dosage was required to combat the massive inocula which were employed

Clinical

Ten cases of whooping cough in infants and young children were treated by Swift (1948) The case records indicate that the primary infection responded in all cases, usually within 48 hours There were 2 deaths, due to multiple staphylococcal lung abscesses and gastro-enteritis respectively A dose of 0 4–0 8 milligram per kilogram 4 hourly was maintained for 5 days Transitory albuminuria and slight pyrexia occurred when impure samples of the drug were given but were not observed with a pure preparation

One case of food poisoning due to *S typhimurium* infection, seen by the writer, responded dramatically to oral aerosporin, almost all Gram negative bacilli disappearing from the stools overnight

[illegible]

AUREOMYCIN (DUOMYCIN)

The production of aureomycin from *Streptomyces aureofaciens* was discovered by a team of workers in the Lederle Laboratories, in the United States of America, headed at first by Dr Y Subbarow and, after his death, by Dr B M Duggar Their work was described in a series of papers read at the New York Academy of Science in July 1948 and the papers have been summarized by Raistrick (1949)

CHEMISTRY

[illegible]

serum

PHARMACOLOGY

When aureomycin is given by mouth, absorption is sufficient for the treatment of infection due to a sensitive micro organism but enough remains in the gut to interfere with the bacterial formation of vitamins of the B group For oral dosage the drug is supplied in capsules each containing 250 milligrams The full daily dose

contains 60 milligrams per kilogram of body weight divided into 4-hourly doses, three such doses may be given at hourly intervals at the beginning of treatment and when the infection is controlled the total daily dose may be halved and the interval increased to 6 hours Parenterally, large doses in animals have caused necrosis, but successful treatment in man has been claimed with a daily intramuscular dose of 10–40 milligrams It would seem that the oral route is to be preferred

Estimation of blood levels is complicated by the rapid inactivation of the drug in neutral solutions such as blood Samples of serum must be frozen without delay, if not tested at once In a man weighing 150 pounds and receiving 0 5 gramme [illegible]

in the adult, a level of at least 2–4 micrograms is to be expected and is usually adequate for treatment Such information as is available indicates that the drug reaches the cerebrospinal fluid in variable concentration but does not exceed one quarter of the blood level

ACTION

The essential mode of action of the drug on sensitive organisms has not been described but the following information is obtained from the papers of Paine, Collins and Finland (1948) and Bryer and his colleagues (1948) Staphylococci, streptococci (including *Str faecalis*) pneumococci, gonococci, meningococci, *Haemophilus influenzae* and the brucella group appear to be inhibited by 2 micrograms per millilitre or less, *Bacterium coli* and the salmonella group by 3–25 micrograms but *Pseudomonas pyocyanea* and *Proteus vulgaris* require 100–250 micrograms Infections with a spirochaete of relapsing fever (*Borrelia novyi*) and with the leptospira of Weil s disease, were controlled in experimental animals (Hailman, 1948), the rickettsial group as a whole and the viruses of psittacosis and lymphogranuloma venereum are sensitive, but no effect was obtained against the viruses of influenza, poliomyelitis or canine distemper

Aureomycin, although a base, is more active at *p*H 6 than at *p*H 8, this may be related perhaps to its instability in alkaline solutions Paine, Collins and Finland (1948) find that, *in vitro*, the number of bacteria present, unless very large, has little influence on the concentration of the drug required for killing they believe that growing organisms only are affected The author's own experiments, however, suggest that the action *in vitro* is almost entirely bacteriostatic It is difficult to correlate the efficacy of aureomycin in the treatment of so many types of infection with the results of *in vitro* tests and estimations of blood level except on the assumption that the drug is for some unknown reason more active in the body than in the test tube

RESISTANCE

The development of resistance to aureomycin *in vivo* has been described but is very unusual, it can rarely be demonstrated *in vitro* even after many subcultures on a medium containing a sub-effective concentration of the drug

TOXICITY

probable that interference with the formation of vitamins in the gut will often require attention.

CLINICAL USES

Aureomycin can be of clinical value in the following infections

- Coccal infections
- Brucellosis
- Typhus probably all forms
- Urinary infections unless due to *P vulgaris* or *Ps pyocyanea*
- Pneumonia due to bacteria or virus (probable)
- Venereal disease
  - Lymphogranuloma
- Virus infection
  - Psittacosis

AUREOMYCIN IN TREATMENT

doses were used from the beginning 0 1 gramme on the first day 0 6 gramme on

In 5 cases of typhoid fever the results were equivocal and failure in the treatment of a carrier is reported by Finland, Collins and Paine (1948), in 16 cases of longstanding urinary infection there was improvement under treatment, but cure could hardly be expected and infection recurred, two cases of non-specific urethritis seemed to respond, but in gonorrhoea the results were less good than with penicillin.

In rickettsial infections treated in the United States of America, the results appear to have been excellent Ross and his co-workers (1948) report success in the treatment of 13 cases of Rocky Mountain spotted fever Symptomatic improve-

aminobenzoic acid Good results are also reported in the treatment of 23 cases of

Q fever (Annotation, 1949b), *two cases which relapsed responded to a second* course of treatment

Wright and his colleagues (1948) claim success in the treatment of lymphogranu loma venereum Their work is of special interest, since they used the intramuscular route of administration in single daily doses of 10–40 milligrams They treated 8 cases of bubo and 3 of proctitis, one of the latter relapsed and responded to further treatment, in 14 cases of benign rectal stricture, there was general improvement with lessened discharge, pain and tendency to bleed, but the fibrous stricture, as expected, was not relieved

Braley and Sanders (1948) describe the effects of local treatment of various eye infections with a solution containing borate buffer, activity being lost within 24 hours All bacterial infections and 2 cases of inclusion conjunctivitis appeared to respond, it appears that the drug may be particularly useful in infections due to staphylococci resistant to penicillin

More recent reports confirm the value of aureomycin in an exceptionally wide field of infection Nichols and Needham (1949) treated 6 cases of staphylococcal bacteraemia yielding strains which were insensitive to penicillin Two cases died,

fully treated 3 cases of tularaemia and in experiments in mice obtained better results than with streptomycin or Chloromycetin Schoenbach and Bryer (1949) treated 13 cases of atypical pneumonia and Meiklejohn and Shragg (1949) treated

from 24 to 72 hours Reports that *Entamoeba histolytica* is sensitive await confirmation The drug has failed up to the present in the treatment of pertussis and infection due to *P vulgaris* and *Ps pyocyanea* in urine, but isolated cases of meningitis due to Gram positive cocci have responded

Eleanor A , and Long

med Ass , 138 946

391
309
6 489

and Washington, J A

139, *275*
(1948) *J Amer med*

Ass , 138 1143

Woodward T E., Raby, W T , Eppes W Holbrook, W A , and Hightower, J A (1949) *J Amer med Ass* , 139 830

Wright, L T Sanders M , Logan M A , Prigot, A , and Hill, L M (1948) *J Amer med Ass* , *138*, *408*

CHLOROMYCETIN

Chloromycetin is produced by a species of streptomyces found by Burkholder in a field in Venezuela the purification and further invest gation was carried out by Ehrlich and his colleagues (1947) in the Parke Davis Laborator es The crystallized material is unusual in that it contains nitrogen and un ionized chlorine in water it

structural formula is as follows D(—) *threo* 1 *p*-nitrophenyl 2 dichloracetamido propane 1 3-diol

ACTION

Chloromycetin is claimed to inhibit the growth of a wide range of bacteria including staphylococci *Brucella abortus* *Bacterium col* Friedlander s bacillus

successful in treating rickettsial infections and psittacosis in chick embryos and in mice but the viruses of variola and influenza were insensitive Smith and his colleagues (1948) of the Parke Davis Laboratories succeeded in treating mice infected with Friedlander s bacillus *Sh flexneri* and *Sh sonnei* pneumococcus and streptococcus (haemolytic and vir dans) but the results were inferior to

activ ty of the drug against rickettsial infection was confirmed

It will be seen that the act vity of Chloromycetin runs closely parallel w th that of aureomyc n There is also a similar lack of toxic ty but Chloromycet n has the advantage in stability Little reference appears to have been made to the development of resistance to Chloromycetin which suggests that as in the case of aureomycin it is a rare occurrence

PHARMACOLOGY AND TOXICITY

Chloromycetin is only soluble in water to the extent of about 0 25 per cent It

from 5 to 7 days In rickettsial infection however it appears that 6 grammes given over the first 18–24 hours is sufficient

In infants and young children capsules cannot be used and a somewhat heav er system of dosage up to 100 milligrams per kilogram is desirable The suspension

dose.

The toxicity of Chloromycetin appears to be slight. Nausea, diarrhoea, irritation of the skin, and headache have been seen but they are uncommon. Anaemia has developed in dogs after prolonged dosage but has not yet been reported in man. It should be remembered, however, that the drug, taken orally, might interfere with the formation in the gut of vitamins such as vitamin K and the vitamin B group.

RESULTS OF TREATMENT

The striking success of Chloromycetin in experimental rickettsial infections led to *the treatment of such diseases in man. In Mexico, 5 cases of epidemic typhus* reported by Smadel and his colleagues (1948a) gave an encouraging response, the

1948b). Treatment was given in 25 cases, and 12 further cases from the same locality and of similar age were observed as controls. An initial dose of 50 milligrams per kilogram was given, followed by 0·2–0·3 gramme every 2–4 hours. This was continued at first for 12 days but later it was found that equal success was obtained if treatment was stopped after 24 hours, 6 grammes in all being given. In the treated cases, the average duration of fever before treatment was 6·2 days and after treatment it was 31 hours, contrasting with an average total fever period of 18·1 days in the controls; there were no deaths or complications in the treated cases and one death and two cases of complication, due to parotitis and pneumonia, occurred in the control series.

the effect in 10 cases. After the usual initial dose, 0·25 gramme was given 2-hourly until the temperature was normal and then every 3–4 hours for 5 days. Treatment began usually about the tenth day and improvement was seen within 24 hours, the temperature settling, on the average, in 3·5 days The blood was sterilized at once and there were only 3 positive stool cultures, from two cases, after treatment began, all urine cultures and all final stool cultures were negative. There were two relapses, both responding to a further course of treatment. One severe haemorrhage and one perforation occurred after the temperature had settled. Amongst 8 cases observed as controls, there was one death and the average duration of fever was 35 days.

) but full

6 cases of

Rocky Mountain spotted fever, found that the temperature became normal in every case within 76 hours; treatment was continued for one day after the fever subsided.

Unpublished reports, obtained through the courtesy of Messrs Parke, Davis and Company, indicate that Chloromycetin has been successful in the treatment of the acute forms of undulant fever, of atypical pneumonia, of bacterial pneumonia due to infection with pneumococcus or Friedlander's bacillus and in a few cases of pertussis Urinary infections, including those due to *Proteus vulgaris*, *Ps pyocyanea* and Gram positive cocci have responded well, but in certain cases cocci have been found, in spite of treatment after the bacilli have disappeared, 2–3 grammes daily, given in 3 or 4 doses for 2 or 3 days have usually succeeded and are then followed

dosage had to be increased up to 100 milligrams per kilogram, in chronic carriers, unfortunately, treatment has so far been unsuccessful

CLINICAL USES

Chloromycetin can be of clinical value in the following infections

Enteric fever	Urinary infection including
Typhus probably all forms	*P vulgaris*, *Ps pyocyanea* (40 per cent) and some Gram positive cocci
Virus infection	Brucellosis
Psittacosis group	Pertussis (probably)
Virus pneumonia (claimed)	

Bradley, W H (1949) ...

Med 29, 656
Smadel, J E, and Jackson, E B (1947) *Science*, 106, 418
— Leon A P, Ley, H L, Jun, and Vareta, G (1948a) *Proc Soc exp Biol, N Y*, 68, 12
— Woodward, T E, Ley, H L, Jun, Philip, C B, Traub, R, Lewthwaite, R, and Savoor, S R (1948b) *Science* 108, 160
Smith, R M Joslyn D A, Gruhzit O M, McLean, I W, Jun, Penner, M A, and Ehrlich, J (1948) *J Bact*, 55 425
Woodward, T E, Smadel, J E, Ley, H L, Jun, Green, R, and Mankikar, D S (1948) *Ann intern Med*, 29, 131

PENICILLIN

HISTORY

In 1929 Fleming reported ...

Raistrick showed penicillin to be a labile organic acid which could be extracted from watery solution by several organic solvents but was destroyed by acids or heat Further progress was not made for lack, it would now appear, of team work such as was later seen at Oxford, but it may be noticed that the earlier workers had revealed the potency of penicillin if it could be concentrated, its amazing lack of toxicity, and had outlined the problem of its concentration

In 1938 Florey, Chain, and their colleagues had finished their study of lysozyme *and decided to work on penicillin They showed that it could be extracted as a salt* from ethereal solution by weak alkalis and that low temperatures prevented loss of activity The crude filtrate was concentrated a thousandfold and dried, but was still non toxic, it was fully active in the presence of pus and could protect mice against staphylococcal, streptococcal and clostridial infections (Chain and his colleagues, 1940) A year later it was shown that penicillin was also active in human infection such as acute staphylococcal osteomyelitis (Abraham and his colleagues, 1941)

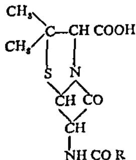
Commercial Production

Up to this time the mould was cultured in flasks, very large numbers of which were necessary to give the required volume In 1941 commercial production on the necessary scale was difficult in Great Britain and was undertaken in the United States of America The advantages of the deep fermentation process, in vats of capacity up to 10 000 gallons, were soon recognized, sterile air must be passed through the liquid to supply oxygen and this, together with the maintenance of the right temperature throughout the whole volume of fluid and the avoidance of all contamination, was far from easy The culture medium was improved, notably by *the addition of corn steep liquor from maize*, and it was found that *P chrysogenum* gave a better yield than *P notatum* under the new conditions The final concentrate is "freeze-dried"

The unit of penicillin used by the Oxford workers, when dissolved in 50 millilitres of broth, just inhibited the growth of the standard staphylococcus When pure crystalline penicillin became available, the international unit was established as 0 0006 milligram of the sodium salt of penicillin II (G) The mega unit contains 1,000,000 units

CHEMISTRY

The generally accepted formula of penicillin is shown below



The side chain R varies with the different penicillins, four of which have been designated in Great Britain as I, II, III and K, and in the United States of America as F, G, X and K. I or F is the form mainly produced by *P. notatum* in surface

a slower action against F and G, X being little affected. Working with rabbits, he showed that X was the most active in the animal body against pneumococcal and streptococcal infections.

As has been stated, penicillin is unstable in solution, destruction being more

fungi, which inactivate penicillin, these micro-organisms are often themselves resistant to the action of penicillin in therapeutic concentrations. The instability of

cleaning the skin before an injection, since the quantity of alcohol reaching the solution cannot be significant.

Dried penicillin, kept in the dark at a temperature below 60° F., should remain fully active for at least a year. Crystalline penicillin is still more stable. Solutions of

him

be

The *British Pharmacopoeia*, 1948 states that injections should contain 50 000 units per millilitre of either sodium or calcium salt with a potency of at least 900 units per milligram. In practice solutions of ten times this strength are commonly used now that relatively pure preparations of penicillin are available. The official oily injection contains arachis oil with 4.5 per cent white bees-wax and 125,000 units of calcium penicillin per millilitre, it must be warmed and shaken before use and the syringe also must be warm and fitted with a relatively wide-bore needle. The oily preparations, if kept cool, remain potent for at least 6 months. Other official preparations include creams, ointments and lozenges.

Inhalation of penicillin in a fine mist has been used in cases of bronchitis, bronchiectasis and lung abscess. The solution contains up to 80,000 units of the

Raistrick showed penicillin to be a labile organic acid which could be extracted from watery solution by several organic solvents but was destroyed by acids or heat Further progress was not made for lack, it would now appear, of team work such as was later seen at Oxford, but it may be noticed that the earlier workers had revealed the potency of penicillin if it could be concentrated, its amazing lack of toxicity, and had outlined the problem of its concentration

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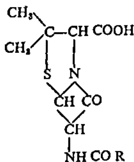
COMMERCIAL PRODUCTION

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a slower action against F and G, X being little affected Working with rabbits, he showed that X was the most active in the animal body against pneumococcal and streptococcal infections

As has been stated, penicillin is unstable in solution, destruction being more

tion, by oxidizing agents, and by the free ions of certain metallic salts, such as zinc, copper, lead, mercury or iron, when these are present in solution Penicillinase is the name which has been given to the enzyme, produced by certain bacteria and fungi, which inactivates penicillin, these micro organisms are often themselves resistant to the action of penicillin in therapeutic concentrations The instability of

cleaning the skin before an injection, since the quantity of alcohol reaching the solution cannot be significant

Dried penicillin, kept in the dark at a temperature below 60° F , should remain

added to the solvent, except when the solution is to be injected into the theca

The *British Pharmacopoeia*, 1948 states that injections should contain 50,000 units per millilitre of either sodium or calcium salt with a potency of at least 900

official preparations include creams, ointments and lozenges

Inhalation of penicillin in a fine mist has been used in cases of bronchitis, bronchiectasis and lung abscess The solution contains up to 80,000 units of the

calcium salt per millilitre and may be atomized in a Collison inhaler attached to an oxygen cylinder It should be remembered, however, that penicillin given systemically passes readily into the bronchial secretion

Insufflation powders for wound surfaces are made by diluting calcium penicillin with sterile sulphonamide powder, usually sulphathiazole, they should be blown *from an insufflator to give an even "frosting" of the wound*

Solutions for intrathecal injection should be made with crystalline sodium salt Smith, Duthie and Cairns (1946) limited dosage to 5 or 6 millilitres at 2,000 units per millilitre but with the pure preparation up to 50,000 units may be given For eye infections, drops containing 1,000 units per millilitre of 1 4 per cent saline solution and 0 03 per cent chlorocresol are instilled at short intervals

Hobby, Levert and Hyman (1947) and others in the United States of America *have found that, unit for unit, impure penicillin may be from 3 to 5 times more* active in the animal body than the pure G salt The enhancing factor has not been identified, it is not destroyed by penicillinase and has been obtained both from the penicillium cultures themselves and from unrelated sources It has still to be seen *whether the additional factor can be isolated in a form free from toxicity*

ACTION

Fleming's original contaminated plate showed lysis of the staphylococcal colonies, proving that penicillin is bactericidal In low concentrations it has also been regarded as bacteriostatic since bacteria are observed which fail to divide and become abnormally long or swollen, but Chain and Duthie (1945) could find no clear evidence of bacteriostasis and they lay emphasis on the bactericidal action Activity is greatest when the bacteria are multiplying rapidly and very slight when they are resting The mechanism of the action remains doubtful but Gale and Taylor (1947) have shown that growing staphylococci are unable to take up *glutamic acid from* the medium in the presence of penicillin Abraham and Duthie (1946) found that [illegible] which are themselves acids, are more active in a moder- [illegible] eas the basic antibiotics, [illegible] ments, Rowley and his colleagues [illegible] the drug is removed from solution [illegible] *This finding may* be related to the earlier observation that *in vitro* the concentration required to inhibit growth varies very little with the size of inoculum, except when the bacterium, like *Bacillus anthracis* and certain strains of staphylococcus, combines sensitivity with the ability to produce penicillinase

RESISTANCE

Micro-organisms, if fully sensitive, are inhibited by less than 0 1 unit per millilitre, [illegible] by about 1 unit, while those [illegible] naturally resistant strains of staphylococcus is more serious [illegible]

that 12 5 per cent of strains examined in 1946 at the Postgraduate Medical School were resistant as compared with 38 per cent in 1947 (Barber, 1947b) Many of the later strains came from patients who had received penicillin and had been in hospital for some time She has shown that patients on admission may be infected with a mixture of sensitive and insensitive cocci, the former often predominating and that after treatment only resistant organisms are left The sensitive and resistant organisms were usually of different phage and serological types She found that all resistant strains produced penicillinase and that the inhibiting concentration of penicillin *in vitro* varied greatly with the number of cocci present, whereas with sensitive organisms their number makes little or no difference There was also clear evidence of the transfer of resistant strains from patient to patient This work indicates that fully sensitive staphylococci do not become resistant but that naturally resistant strains, through transfer from patient to patient, may constitute a growing problem, especially in hospitals In general, it seems probable that fully sensitive organisms do not acquire resistance *in vivo* In the case of partially resistant organisms the position is much less clear, dosage should be high from the beginning and combined treatment with sulphonamides should be considered if the latter are known to exercise some degree of control over the infection

PHARMACOLOGY

Penicillin can be given by mouth to infants under 6 months old The daily dose recommended by Buchanan (1946) is 4 000 units per pound of body weight, given in the feeds In adults oral administration is still unreliable and extravagant Stewart and May (1947) found that penicillin is best taken on an empty stomach with 20 grains of sodium bicarbonate or citrate in 4 ounces of 5–10 per cent glucose solution but they consider that the dose should be 10 times the corresponding intramuscular dose They find that the varying absorptive capacity of individuals constitutes a greater problem than the acidity of the stomach The peak of the blood level usually occurs about 40 minutes after ingestion

After intramuscular or subcutaneous injection the maximum blood concentration is reached in 15 minutes or less The drug is distributed throughout the tissues of the body, the important exception being the cerebrospinal fluid It is true that in acute meningitis measurable levels are usually found but there is general agreement that such conditions demand intrathecal administration Penicillin is to some extent destroyed in the body but the greater part reaches the urine Excretion is extremely rapid and is mainly tubular in character

The concentration of penicillin in the plasma after a standard injection may vary considerably in different people and even in the same person at different times As an indication of the levels to be expected, however, the figures of Fleming and his colleagues (1944) may be quoted After 15,000 units given intramuscularly the blood level falls in about 3 hours to 0 03 units, the lowest effective concentration, with 50 000 and 100,000 units the times are 4 and 5 hours respectively If the minimal level must be maintained throughout the day, it is clear that the 3 hourly dose of 15,000 units is the most economical It was, therefore, adopted in the early days when penicillin was scarce The intramuscular drip used even less penicillin and was somewhat less painful when the sample was impure With modern preparations

is usually seen in a prolonged or second course of treatment. Since it may be due to impurities in the preparation, trial may be made of a different brand or of the crystalline salt if further treatment is necessary.

The most serious accident resulting from penicillin therapy is infection from contaminating organisms, especially in the meninges. Very strict aseptic precautions must be observed in making intrathecal injections and in the preparation of the instruments and solutions employed; each dose should be in a separate glass ampoule. Apart from infection, penicillin may cause some degree of irritation in the meninges.

[illegible]

PENICILLIN IN PRACTICE

At present penicillin must be injected and precautions against sepsis are necessary. Outside hospitals, therefore, and also for reasons of economy, sulphonamides [illegible]

with mild antiseptic such as penicillin cream or Dettol ointment, until healing is complete. *In established furunculosis the same routine should be observed for each* new lesion but, in addition, bacteriological search should be made for the site of carriage of the infection, usually the anterior nares; it is often impossible to eradicate the staphylococcus from the nose but Dettol ointment applied twice daily can "keep it in its place".

Severe infections requiring treatment with penicillin should be nursed in hospital. The dosage and length of treatment varies with the type of lesion and, sometimes, the sensitivity of the organism. The latter should be tested in every case so that resistance, if present, can be known at once.

In acute osteomyelitis treatment usually lasts 3 weeks and with 3-hourly injec- [illegible]

being tried only when there is no response in the temperature.

In prophylaxis, penicillin is mainly given to prevent the spread of infection during and after operation. It is much used in orthopaedic, thoracic and other forms of surgery but a special plea may be put forward for rheumatic patients undergoing dental or other minor operations: a single injection of 100,000 units just before tooth extraction is a valuable insurance against endocarditis.

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A.

K.

STREPTOMYCIN (INCLUDING NEOMYCIN)

ACTION

bactericidal concentration was little higher than the bacteriostatic Streptomycin, being a base, is more active in alkaline than in acid solution

RESISTANCE

Streptomycin therapy is always subject to the threat that the invading micro-organism may become resistant Amongst the rapidly multiplying bacterial species the change takes place in 1–2 days and the degree of resistance achieved is, for practical purposes, absolute. It is probable that in sensitive strains, individual

bacteria exist which are relatively insensitive from the first and which, as they multiply, become more and more resistant. The same phenomenon is seen in the

though common in organisms derived from more chronic lesions. Satisfactory methods of countering this tendency have not yet been found but it is hoped that combinations of streptomycin with other drugs will prove effective, on the assumption that the resistant organisms are, at first, present in small numbers and will be inhibited by the second drug.

PHARMACOLOGY

Streptomycin is measured in grammes, milligrams, or micrograms; for the concentration in solution the unit volume is the millilitre. The unit was defined as one

to reduce the general flora. For systemic administration the injections are intra-

grammes in the adult or 20 milligrams per pound of body-weight in children; in tuberculosis 1 gramme daily in the adult or 10 milligrams per pound in the child appears to be adequate. In the normal person little streptomycin passes to the cerebrospinal fluid, the level seldom reaching one microgram per millilitre,

cent solution), yielding levels of 750–2,000 micrograms 1–3 hours later and 16–32 micrograms at 24 hours. The injections cause irritation to the meninges with a rise in the protein content and white-cell count; when continued daily for months, as

streptococcus, to solutions of streptomycin to be used for intrathecal injection.

biotic therapy.

Excretion is mainly through the kidney, being glomerular and unaffected by caronamide. With a daily dose of 2 grammes concentrations of 1,000 micrograms or more are found in the urine.

TOXICITY

With excessive dosage or in renal failure, streptomycin may accumulate in the [illegible] orexia, [illegible] blood [illegible]

dosage in meningitis [illegible]

rashes are common but need rarely interrupt treatment It is claimed that dihydrostreptomycin is less toxic than the parent drug (Annotation, 1949)

TREATMENT

As an antibiotic, streptomycin is remarkable for its influence on the active tuberculous lesion, present in such conditions as meningitis, miliary tuberculosis, peritonitis, laryngeal and tracheobronchial infection and the acutely spreading pulmonary conditions, whether spontaneous or post-operative By contrast the chronic lesion, caseous or fibrotic, receives no benefit, and with its poor blood [illegible]

improvement and may ultimately contain many resistant bacilli capable of infecting other people To limit this risk, the course should be kept short, the chief benefit is usually obtained in the first six weeks and treatment should not continue for [illegible]

cases is now being treated in order to establish this point. In meningitis systemic treatment has usually lasted for 6 months, combined with intrathecal treatment which at Oxford (Smith, Vollum and Cairns, 1948) has continued daily for 4–5 months, the lumbar and ventricular routes being mainly used Cathie (1949), adding streptokinase to the intrathecal injection, has found that a course of 6 weeks, with increasing intervals of up to 3 days between injections, will restore the cerebrospinal fluid to normal in favourable cases The final results in this condition are still in doubt.

[illegible]

is advised.

Infections of the urinary tract with *Proteus vulgaris* or *Pseudomonas pyocyanea* may respond in 2–3 days but in many cases the
the same p
it is consid
accordingl
consider that streptomycin should not be used until other methods, including mandelic acid, sulphonamide and penicillin, have failed, they then usually obtained a pure or almost pure culture of one resistant organism If this proved to be sensitive, the urine was made alkaline and streptomycin injections of 0 5 gramme 6-hourly, totalling 5 grammes in all, were given in association with penicillin and sulphonamide, their clinical results in 12 cases were excellent, including one only in which resistance appears to have developed For the results of treatment in other infections see the reports of Keefer and his colleagues (1946) and Wilson (1948)

GENERAL CONCLUSION

In the following Table an attempt is made to indicate the infections likely to respond to the chemotherapeutic agents, the degree of response being suggested by the number of + signs

	Sulphonamides	Penicillin	Streptomycin
Staphylococcus	+	+++	++
Strep pyogenes	+++	+++	
Mouth streptococci	±	+ or +++	
Strep faecalis	−	−	+?
Pneumococcus	+++	+++	
Meningococcus	+++	+++	
Gonococcus	+++ (or −)	+++	++
C *diphtheriae*	−	++*	
B anthracis	±	+++	
Actinomyces	±	++	
Clostridia	±	++*	
Spirochaetes	−	+++	
B coli	++	−	+++
Proteus	±	−	+++
Ps pyocyanea	±	−	+++
Enteric group	−	−	−
Dysentery group	+++	−	+++
V cholerae	+	−	?
Past pestis	+	−	+++
Past tularensis	−	−	+++
Brucella	−	−	−
H influenzae	+	++	+++
H pertussis	−	−	−?
M tuberculosis	−	−	++
Virus Psittacosis group	−?	±	
Virus Others	−	−	

* Surgery antitoxin or both are also necessary † Karamchandi and Sundar Rao (1948).

Such tabulation necessarily ignores the effect of treatment with two or more drugs in combination. This may reasonably be attempted when there is a known risk of resistance developing to the more active drug, for example, with streptomycin always and with penicillin in the presence of a relatively resistant staphylococcus, treatment should be established first with the less active drug, usually a

NEOMYCIN

Recently Waksman and Lechevalier (1949) have published a preliminary report on neomycin, a new antibiotic produced by a streptomyces derived from soil.

clinical trials, it is clear that neomycin may be a substance of great value in therapeutics, especially in the treatment of tuberculosis.

DEVELOPMENT OF RESISTANCE

[illegible]

tion Such resistance becomes permanent in the strain and renders further treatment with sulphonamides useless, except in the early stage when a change to a more active sulphonamide may prove to be effective. This resistance extends to the sulphonamide group as a whole but not to other antiseptics or to antibiotics The change is unlikely to occur in a short intensive course of treatment but constitutes a real danger when prophylaxis over a long period is attempted It may also happen that the infecting strain, though of a species normally sensitive, is from the first resistant, this may be suspected if there is no rapid response to treatment and demands bacteriological investigation of the infection if this is not already in hand

ABSORPTION

Apart from those preparations designed to combat intestinal infection, the sul- [illegible]

injection There is also rapid absorption from serous cavities such as the peritoneum and from raw surfaces such as large burnt areas

DISTRIBUTION

Having reached the blood stream the drug is distributed to the tissues, except bone and fat, equilibrium being reached about 4 hours after oral ingestion There [illegible]

active compounds and is thought to explain the fact that the level of sulphathiazole in the cerebrospinal fluid is only 15–40 per cent of that in the blood, the levels found with the sulphadiazine group range around 50 per cent or more It seems possible, though not usually stated, that, as in the cases of penicillin and streptomycin, [illegible]

caution during pregnancy When there is risk of infection to mother and child during labour, however, a prophylactic dose is fully justified

EXCRETION

[illegible]

the conjugated drug (the acetyl derivative) is not [illegible]

been reported with both drugs, being least common with Sulphamezathine It is only with sulphanilamide and sulphacetamide that the risk can be ignored A detailed review of the pharmacology of the sulphonamides is given by Hawking (1944, 1945) the War Memorandum No 10 (Medical Research Council, 1945) covers all aspects of sulphonamide therapy, including methods of chemical estimation and bacteriological control, and should also be consulted For estimation of the sensitivity of bacteria to sulphonamides *in vitro*, *see* Harper and Cawston (1945)

ADMINISTRATION

General Considerations

If a chemotherapeutic agent is to control an existing infection in the body, it is essential, first, that the infecting micro-organism should be susceptible to concentrations of the agent which are not toxic to the patient and, secondly, that the agent should make contact with the micro-organism in the necessary concentration. For the second point the anatomical character of the lesion must be suitable The best conditions are to be found in spreading lesions such as acute erysipelas or lobar pneumonia in which the invading bacteria are carried forward, as it were, in a wave of oedema fluid in advance of the leucocytic reaction, since there is no necrosis of tissue and the blood supply is not cut off, the drug can easily make the necessary contact Such conditions are ideal for the action of sulphonamides since there is fever, which enhances their activity, and the micro-organisms are multiplying

lower the risk to the kidney and also, perhaps, the tendency to hypersensitivity (Lehr, 1947) but the total dosage should be kept within the normal limits.

PROPHYLACTIC DOSAGE

The use of sulphonamides in prophylaxis will be discussed later. From 1 to 2 grammes of sulphadiazine have been given daily in the United States of America over periods varying from 1 to 3 days in the case of epidemics of meningococcal meningitis, to courses lasting for a whole winter in individuals subject to rheumatic fever. In the longer courses the patient must be kept under careful observation in order to detect the development of toxic symptoms; the dose required to keep the blood level between 1 and 2 milligrams per 100 millilitres of blood should be established in each case.

INTESTINAL BACTERIOSTASIS

Sulphaguanidine was the drug chiefly employed during World War II in the treatment of bacillary dysentery. It is, however, absorbed from the gut to a considerable extent (30–60 per cent) and in dehydrated patients has given rise to renal

but higher dosage has been recommended.

URINARY TRACT INFECTIONS

The concentration of sulphonamides is much increased as they pass from the blood into the urine. Large doses are, therefore, unnecessary in infection of the urinary tract. In the majority of cases of straightforward infection with *Bacterium*

which is amply sufficient for the control of a sensitive organism In the case of sulphadiazine, with a daily dose of 6 grammes and a urinary output of 1,500 milli-

-thirds being

cked by pus,

us vulgaris or

respond to sulphonamide treatment.

LOCAL TREATMENT

Dry powder

This has been sprinkled over the surface of wounds and in the peritoneum in peritonitis The more active compounds, such as sulphadiazine, being relatively insoluble, should be used, but the wound must not be packed with the drug, masses of which can act as foreign bodies When large raw areas are treated much of the drug is absorbed and may reach the blood stream in toxic amounts

Creams

Water soluble creams have been used in the treatment of burns and of other raw areas, sulphanilamide and sulphathiazole in concentrations around 5 per cent are the drugs most frequently used In the treatment of septic skin conditions such preparations are likely to give rise to hypersensitivity

Solutions

Sodium sulphacetamide, 10 per cent, has proved most useful in the treatment of infection of the conjunctiva and cornea and in prophylaxis after injury to the eye

TOXICITY

General Precautions

Since very serious toxic reactions may occur during sulphonamide therapy certain general precautions should be taken when these drugs are prescribed

Rest in bed

[illegible]

Total dosage

Treatment must not continue any longer than is necessary The fact that a patient is still taking sulphonamides should be shown clearly on the temperature chart For cases treated at home the total amount of the drug necessary for the course should be prescribed, and no more.

History

It is important to ask whether the patient has had previous sulphonamide treatment and, if so, whether there were any toxic effects Any such treatment may have produced hypersensitivity

Specific Toxic Effects

Nausea and vomiting

This is most common with sulphapyridine and, to a lesser extent, with sulphathiazole Drugs of the sulphadiazine group and sulphacetamide are better tolerated and should be used in preference

Cerebral symptoms

Disorientation is common in patients on full dosage but is rarely severe enough to require cessation of treatment

unless the patient has had previous sulphonamide treatment and that usually, though not necessarily, with the same compound.

Treatment.—As soon as [illegible]

agranulocytosis is not present. When the patient is better [illegible]

att[illegible]

1 g [illegible]

abandoned if not quickly successful.

CONDITIONS RESPONDING WELL TO SULPHONAMIDE TREATMENT

Infections due to the following micro-organisms may be expected to respond to treatment with the sulphonamides, except when pus is present: Haemolytic streptococcus (*S. pyogenes*), pneumococci, meningococci, gonococci, the shigella group [illegible]

lander's bacillus) may sometimes respond to the more active compounds. Certain virus diseases, such as trachoma, inclusion conjunctivitis and lymphogranuloma venereum, respond well to sulphonamides and a few cases of pneumonia due to the psittacosis group of viruses have appeared to respond. In staphylococcal infection penicillin should be used but sulphonamides, properly applied, can protect fresh wounds or burns against this type of infection.

PNEUMONIA

Except, perhaps, in the case of typical lobar pneumonia which is always pneumococcal, bacteriological examination of the sputum before treatment starts is of [illegible]

suggested for severe infection should be used. Since it may be very difficult to make the urine alkaline in pneumonia, Sulphamezathine may be regarded as the safest preparation, or a mixture such as Sulphatriad may be used.

MENINGITIS

[illegible]

present, treatment with one of the sulphadiazine group in full doses should succeed. Against streptococcal, staphylococcal or pneumococcal infection penicillin is [illegible]

antiserum, or to streptomycin, but the most effective combination of these various agents is still under investigation.

INFECTION OF THE URINARY TRACT

This has already been discussed Treatment is most successful in infection due to Bact coli The diagnosis and treatment of any underlying surgical condition remain essential if further infection is to be avoided

INTESTINAL INFECTION

than one course is frequently necessary, especially in Sonne infections, with repeated bacteriological examination of the stools Enteric fever does not respond to sulphonamides alone and they should not be used In ulcerative colitis and infantile gastro-enteritis the results of treatment are uncertain and certainly not specific

PROPHYLACTIC USE OF SULPHONAMIDES

This subject has been reviewed by Cruickshank (1946) When the course of treatment is short, prophylaxis can be employed without misgiving An outbreak of meningococcal meningitis can be stopped by giving 1 gramme of sulphadiazine twice daily for 2 days to all persons Similar epidemics of bacillary dysentery can

operation the drug can be continued as soon as the patient can take fluids

Treatment of the individual who is subject to rheumatic fever, which commonly follows streptococcal infection, may more reasonably be attempted, but the patient should be watched carefully for toxic reactions during treatment, and should not be a streptococcal carrier with fibrotic tonsils

F C. O VALENTINE

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ANTIGEN THERAPY

DEFINITION

Immunotherapy is best defined as treatment by living attenuated or killed bacteria and the r prod cts n o der to

specific and non specific immunotherapy

SPECIFIC IMMUNOTHERAPY

Two main methods of obtaining specific immunization are available to us

(1) Active immunity By inoculation parenterally with an emulsion of organisms living attenuated or dead soluble toxins or toxoids and viruses active immunity can be produced against many infective diseases

(2) Passive immunity When time is too short to produce active immunity specific antibodies may be injected for example the therapeutic use of diphtheria and tetanus antitoxin The use of human convalescent sera against measles comes under this heading The use of animal sera may be complicated by acute anaphylaxis at once or later by serum sickness The immunity derived from this method is usually of short duration Passive immunity is not dealt with in this article

ACTIVE IMMUNITY

Under this heading come vaccine therapy vaccine prophylaxis and toxoid treatment

Vaccine Therapy

In view of the advances made in the field of chemotherapy in recent years one would be justified in assuming that the scope of vaccine therapy would be correspondingly diminished On the contrary recent work suggests that vaccines enhance the efficacy of chemotherapeutic agents and that better results are achieved by chemotherapy plus vaccines in some cases than by either chemotherapy or vaccines alone Another fact to be borne in mind is that although penicill n and the sulphonamides may succeed in eliminating an infection they do not necessarily leave behind an increased immunity to that infection

and Guérin for active immunization against tuberculosis and the inoculation against yellow fever Recent work on the uses of the influenza and common cold viruses in this direction suggests that this method may be extended shortly

Preparation of vaccines

Vaccine therapy aims at the production of an active immunity developed in the tissues and tissue-fluids of the patient in response to a stimulus provided by the

and standardized and preserved In order to prepare vaccines of maximal antigenic power, it is necessary to use not only virulent cultures, but cultures that have been recently isolated or cultures that have had their virulence restored by animal passage

catarrh and anti-cold vaccines, which should, so far as possible, be prepared from

This epidemic must have been due to the use of T A B vaccine of poor quality because few of the patients showed any evidence of having been immunized as judged by the presence of H or O agglutinins in their serum The British troops, however, were protected by their prophylactic inoculation with T A B vaccine

delayed Again, in some instances it has been observed that some strains of an organism yield a much more potent antigen than others In the case of the staphylococcus, the author noted this fact 30 years ago, long before we understood the importance of using a strain which gave a high toxin yield and therefore a high toxoid yield

The method of killing the vaccine emulsion is also important and only the minimal amount of heat necessary to kill the organism should be used, say 57°–60° C for 30–60 minutes Most important of all, perhaps, preservative must not be added until after all heat treatment is finished and the emulsion has been cooled As regards standardization, the opacity tube method suffices for not only is it simple and rapid but it is sufficiently accurate for practical purposes

reason why a vaccine up to 3 years old may not be used At room temperature, a vaccine will lose about 50 per cent of its antigenic power in 12 months

Dosage of vaccines

Much of vaccine therapy is still largely empirical and must of necessity remain so until more methods of assaying rises in immunity are available We must continue to rely on clinical observation for guidance as regards the rate of increase and the interval between doses

Reactions —Reactions to vaccines may be classified under the headings of local, focal and general *The optimal dose is one that either produces or just falls short of*

double the normal interval, will be followed by no reaction whatever If, however, the reaction persists in spite of these measures, further vaccine administration should be suspended for at least a month and when resumed the dose should be reduced to one-hundredth of that which caused the reaction The site and nature of the focal reaction has some bearing on subsequent treatment For example, a fresh patch of inflammatory exudate at the macula will be regarded with much more apprehension than some increase of pain in a case of fibrositis

Test doses —Focal reactions are not uncommonly met with as a reaction to test doses In the Mantoux test, for example, it has been the practice at St George's Hospital to use a 1 10,000 dilution of old tuberculin, human and bovine separately, injecting 0 05 millilitre of the former intradermally into the right forearm, and a similar amount of the bovine into the left forearm In the majority of cases this is tolerated well, but occasionally it has been followed by a marked increase of

without some adrenaline close at hand In cases that give a positive history, it is probably safer to use the scratch test, though the information it gives is not quite so accurate

STAPHYLOCOCCAL INFECTIONS

Staphylococcal vaccines

With the majority of vaccines we have no means of assessing the degree of immunity produced and we are generally dependent on clinical observation for information on this point In the case of the staphylococcus, however, injections of vaccine, more especially when accompanied by staphylococcal toxoid, are followed by an increase

ponents of staphylococcal toxin is a haemolysin, so one of the components of the antitoxin is an anti-haemolysin By estimating the amount of staphylococcal anti-haemolysin in the patient's serum, it is possible to follow the response to treatment. The normal average amount of staphylococcal anti-haemolysin is 0·7 international units per millilitre of serum Wide variations are met with, for on the one hand, in cases of fulminating staphylococcal septicaemia, the figure may be zero, or, in fact, one may be able to demonstrate circulating toxin, whilst on the other, either as the result of an extremely chronic staphylococcal infection, or more probably as the result of treatment, the serum may contain as much as 20–30 international units per millilitre.

Treatment —The vaccine treatment of acute staphylococcal infections has now been replaced by penicillin and sulphathiazole, but staphylococcal vaccines plus toxoid will still be required in the treatment of chronic and recurrent staphylococcal infections such as boils, carbuncles, styes and staphylococcal dermatitis Staphylo-

anti-haemolysin should be estimated and if the response to the antigenic treatment has been inadequate, the case should be reviewed most carefully for some hidden focus of infection.

THE COMMON COLD AND CATARRH

food.

Infection with a virus

that makes it susceptible to infection by organisms of the catarrhal group. It is this secondary infection which is chiefly responsible for the persistence of the catarrh and its more unpleasant symptoms The more common members of the catarrhal group of micro-organisms are the various types of streptococci, pneumococci,

with considerable advantage.

Stock vaccines.—A vaccine composed of some or all of these organisms may be used for prophylaxis or treatment Many laboratories prefer to make their own At St George's Hospital, we have for the last 25 years prepared our stock anti-catarrh vaccine, which, up to 1936, was composed of pneumococci types I, II, III and IV, *H influenzae*, about a dozen strains of streptococci, viridans and haemolytic, and *M catarrhalis* It was issued in a strength of 400 millions *H influenzae*, and 200 millions of each of the others, to the millilitre After 1936, less attention was paid to the types of pneumococci, as this necessitated using old stock cultures, and more attention was concentrated on the inclusion of primary and secondary cultures In

catarrh vaccine was put up each September and was composed largely of a blend

Autogenous vaccines.—These are prepared from cultures grown from swabbing of the upper respiratory tract during the later stages of a cold The routine is to take swabs from both tonsils or tonsillar fossae, using sufficient pressure to express

media for vaccine preparation The tonsil swabs should also be inoculated on to a Löffler slope or a tube of blood-tellurite medium to exclude the Klebs-Löffler bacillus In some cases two sets of media are inoculated, one being incubated aerobically and the other anaerobically Whenever possible, the primary cultures are included in the vaccine emulsion and, since in many cases 90 per cent or more of the colonies are of one type, this is done frequently

Dosage.—For purposes of prophylactic vaccination it is advisable to use a mixture of an autogenous vaccine containing the predominant organisms and add this to a good stock vaccine St Mary's Hospital Inoculation Department prepares an anti-catarrh vaccine which is marketed by Parke, Davis and Company It has the following formula

The stock anti-catarrh vaccine used by the author (named triple anti-catarrh vaccine), is composed of equal volumes of the above, Glaxo dissolved anti catarrh vaccine and St George's Hospital anti catarrh vaccine As regards dosage, the original vaccine should be put up in a strength of about 500 millions of each organism per millilitre, and dilutions of 1 . 10 and 1 . 100 prepared The initial dose

should be 0 1 millilitre of the 1 : 100 dilution, or 500,000 of each organism, the second dose 0 2 millilitre, the third 0 4 millilitre, the fourth 0·7 millilitre and the

creased to 6 days and later to 7 days It is rarely necessary to exceed a dose of 0 5 millilitre of the full strength, that is, 250 millions of each organism plus the same amount of the stock anti-catarrh vaccine The immunity conferred by vac-

patients come back at the end of each summer for another course.

Allergic catarrh

Catarrh may be due to sensitization to some particulate foreign protein suspended in the air It is usually fairly simple to suspect such a sensitivity from the history, for whereas the bacterial type generally gives a history of being much worse during the autumn and winter months, this third group is either unaffected by season, or is

solution, which embraces the more common shrubs, grasses and trees, under the title of "Mixed Pollens B4". These three preparations are put up as test solutions and desensitizing solutions The test may be made by scratch or by intradermal injection In practice, the author has come to the conclusion that it is sufficient to

testing should not be done during the summer Catarrh due to hypersensitivity to these foreign protein inhalants may be associated with asthma In a small percentage of cases only partial success will result by using the stock solutions for desensitizing and, if complete success is to be obtained it may be necessary to prepare an extract from the dust of the patient s own bedroom or in the case of a

Desensitization —This is best done by giving the patient a series of subcutaneous or intramuscular injections of gradually increasing doses of the offending group First prepare a 1 10 and a 1 100 dilution of the Bencard preparation labelled ' Continuation Course The initial dose for an adult should be 0 25 millilitre from the 1 100 bottle and if this is well tolerated the second dose should be 0 5 millilitre, the third 0 75 millilitre and the fourth 1 millilitre Two or three minims of adrenaline should be added to each dose and the interval between doses should be 3 days The 1 10 bottle should be dealt with similarly, except that the rate of increase should be 0 1 millilitre for each dose, and as the doses get larger the interval should be increased, first to 4 days and then to 5 and later to 7 days It is rarely necessary to exceed a dose of 1 millilitre of the ' Continuation Course strength The greatest care must be taken to avoid any of the solution entering a vein as the later doses contain sufficient foreign protein to cause severe anaphylactic symptoms For this reason it is safer to give the injections subcutaneously, as it is easier to make certain that the point of the needle is not in a vein Cases o mixed aetiology, in which a foreign protein allergy is complicated by a sensitivity to bacterial infection are not uncommon In such cases, the desensitization course may be accompanied by a course of graduated doses of an autogenous vaccine but in many cases foreign protein desensitization alone is sufficient

THE TECHNIQUE OF INTRADERMAL INJECTION

work A small bore and
desirable Doses up to a
way though usually the

as to render the skin taut and fixed The point of the needle is then inserted into

appear, and, furthermore, if it is a test dose such as a Mantoux or Schick, the result will be negative, regardless of the true state of affairs Sites other than the forearm may be preferred and will serve equally well from the point of view of the test

Intradermal injections are used chiefly for tests, such as the Mantoux, Schick, Dick, and tests for allergy They may also be used for the administration of vaccines in very susceptible patients, the rate of absorption being slower than by other routes In addition, some immunologists hold the opinion that the maximal antigenic response is provoked by intradermal injection.

TUBERCULIN USED THERAPEUTICALLY

Several varieties of tuberculin are available for therapeutic use, but in the author's opinion, bacillen emulsion is the preparation of choice It is the preparation that most closely resembles a vaccine, in that it consists of a suspension of the tubercle bacilli, which have undergone a preliminary fragmentation by means of an agate pestle in an agate mortar After carefully drying *in vacuo*, it is standardized by weight Unless the type of the infecting organism has been diagnosed, a mixture of the human and bovine strains should be used The emulsion can be purchased in 1 millilitre bottles, containing 5 milligrams of the dried powder This should be diluted with 9 millilitres of 0 5 per cent carbol saline, giving a 1 10 dilution and containing 0 5 milligram per millilitre A series of dilutions, each being 1 10 of the preceding, is put up, the last one being a dilution of 1 10,000,000 of the original This extreme dilution is a matter of convenience, as many of the cases to be treated will not only require a very small dose, but also a very gradual rate of increase

Mantoux test

In close association with the therapeutic use of tuberculin is the Mantoux Of the many tests suggested as an aid to diagnosis in tuberculosis, the Calmette, von Pirquet, Mantoux and patch tests have alone survived the test of time, and of these, the last two are those most generally employed The Mantoux test consists of the intradermal injection of a small amount of old tuberculin Old tuberculin is a very toxic preparation and can be obtained in both human and bovine varieties. The technique usually employed by the author is to inject 0 05 millilitre of a 1 10,000 dilution of the human variety into the skin of the right forearm and the same amount of the bovine preparation into the skin of the left forearm. The point of using the two types separately is not only to assist in the diagnosis of the type of infection present, but to help in differentiating between a specific and a non specific positive result A positive result is denoted by an area of erythema 0 5–5 centimetres in diameter, which in the more strongly positive cases is indurated Occasionally it will go on to vesiculation, pustule formation and loss of epithelium A positive result of equal degree on the two arms can generally be interpreted as a non-specific positive result and is often seen in patients who suffer from some allergic condition A specific positive result manifests itself by showing a much more marked reaction on one side It is by no means uncommon to see a strongly positive reaction on one side and a completely negative reaction on the other It is commonly stated that persons of 50 years of age and over will mostly be positive reactors and that it is, therefore, useless to do a Mantoux test This is not true, for a negative reaction in old people is often seen

desoxycholate, together with a blood-agar plate is undertaken, the following facts will be observed.

The MacConkey plate will show numerous colonies of a lactose fermenting *B coli* and a few pin-point colonies of *Streptococcus faecalis* If the same procedure

the blood-agar plate may show that some or all of the coli colonies are haemolytic and may indicate the presence of colonies of *Staph aureus*, *Str. viridans* or *Str haemolyticus* Although the sulphonamide compounds can cope successfully with many intestinal infections, cases which are resistant or cases in which recurrence follows the withdrawal of the drug may occur. It is in this type of case that a course of autogenous vaccine of the abnormal coliform organism together with a vaccine of any abnormal streptococci may do good

INFECTIONS OF THE GENITO-URINARY TRACT

Most infections of the genito-urinary tract react so favourably to appropriate chemotherapy that only on rare occasions is a vaccine called for. Recurrent epididymitis, cystitis and pyelitis due to infection with *B coli* are by no means uncommon and, although the infection is rapidly eliminated by a short course of a sulphonamide, it recurs just as readily as soon as the drug is stopped The cause

resistance to the organisms concerned must be increased An autogenous vaccine is certainly worth a trial, and it is sometimes successful

Gonococcal infections are so readily cleared up by treatment with penicillin and sulphonamides that vaccines are no longer used, but the secondary infections that are able to establish themselves as the result of damage to the mucosa, may call for vaccine treatment.

INFECTIVE ARTHRITIS

... one or more joints become swollen and painful

and if fluid is aspirated from it, apart from containing a few leucocytes and endothelial cells, nothing abnormal is found It is really an allergic phenomenon, the

causative organism and preparing an autogenous vaccine if success is to follow, once again the essential pre-requisite is accurate bacteriological diagnosis For, whereas during the acute stage, when several joints are involved and the temperature raised, protein shock is likely to give the best immediate result, for long term treat-

be made Teeth

of the mouth and

gums The contents of any pockets should be examined by film and culture, both aerobic and anaerobic Any evidence of apical infection should be dealt with by

4 or 5 days until a dose of 10 millions has been reached The interval should then be increased to 6 or 7 days In successful cases, a favourable response is evident in 4–8 weeks If no improvement has occurred by this time a fresh bacteriological survey should be made

VACCINES USED FOR PROPHYLAXIS

In addition to the instances already mentioned, vaccines are used extensively for

fever, and a combination of vaccine plus toxoid in staphylococcal infections

NON SPECIFIC IMMUNOTHERAPY

By the injection of certain proteins it is possible to provoke a profound reaction in

peptone, proteoses mercurochrome, gelatin, and colloids Closely related is the use of malaria and relapsing fever for therapeutic purposes If benefit is to follow, it is

will suffice This should be followed by a rigor in 45–60 minutes and a rise of temperature to the 102°–103° F level, which is maintained for 2–4 hours, and 12–18 hours after the injection the patient will have quite recovered Usually a course of three "shocks is required, the second injection being given not less than 24 hours after temperature has become normal, and it should be of a strength of 40 millions if the same amount of reaction is desired The third dose should be

often cause reactions, and have no demonstrable effect on the blood Bone-marrow extracts, liver extracts, folic acid, and pyridoxine, although harmless, have not been found to promote leucocytosis Transfusions of blood from patients with chronic myeloid leukaemia or of "leucocyte cream" are equally valueless A transfusion of normal blood is useful if there is coincident anaemia, but on the agranulocytosis *itself* it has no effect

TREATMENT OF CHRONIC NEUTROPENIA

Treatment depends on the cause of the neutropenia Those cases due to bone-marrow failure are discussed in the appropriate sections The only hope of radical relief in primary and secondary splenic neutropenia is offered by splenectomy Before this operation is considered it is essential to know that the bone marrow contains abundant granulopoietic elements and, in the secondary forms, that the pathological process causing splenomegaly is not likely to be rapidly progressive In all varieties acute exacerbations with infection will require treatment with penicillin

ANAEMIA

INTRODUCTION

A patient is said to be anaemic when the number of erythrocytes or the quantity of haemoglobin in a stated volume of his blood falls below the figures accepted as normal It is well to recall that this traditional definition takes no account of the

the raised erythrocyte count due to reduction of plasma volume in burns In spite of these shortcomings, the conventional notion of anaemia treats of values easily and rapidly determined and has long established its clinical utility

In general terms there are but three mechanisms which lead to anaemia blood loss failure of blood formation and excessive blood destruction Voluminous haemorrhage will result in acute anaemia, but persistent or repeated blood loss depletes the body of iron and, when this essential component of haemoglobin is lacking, erythropoiesis becomes defective Thus with the exception of acute haemorrhage, which is outside the scope of this article, anaemia is always due to a disturbance of the balance normally *held between formation and destruction of erythrocytes*

the main varieties of anaemia of

be remembered that two or more of these mechanisms may be simultaneously operative in a single patient, and that, to some extent, the different forms of anaemia are *less distinct than the detail of the classification would suggest*

ANAEMIA

Classification of Anaemias

Anaemias due to defective blood formation (dyshaemopoiesis)

(a) Due to deficiency of factors essential for haemopoiesis
- (i) Iron
- (ii) Liver principle and related substances
- (iii) Other factors

(b) Due to myelophthisic processes

Leukaemia, reticulosis reticulosarcoma, myelomatosis, metastatic carcinomatosis, osteosclerosis, myelosclerosis

(c) Primary refractory ("aplastic") anaemias
- (i) Due to known noxious agents
- (ii) Of unknown cause

(d) Secondary refractory anaemias
- (i) Of chronic infection and malignant disease
- (ii) Of renal failure
- (iii) Of hepatic failure

Anaemias due to excessive destruction of blood (haemolysis)

(a) Due to exogenous haemolysins
- (i) Infective agents
- (ii) Toxic agents

[illegible]

- (a) Acute (Brill Lederer)
- (b) Chronic (Hayem Widal)

(c) Due to abnormalities of the erythrocyte
- (i) Congenital
  - (a) Familial haemolytic (acholuric) jaundice
  - (b) Sickle-cell anaemia
  - (c) Mediterranean anaemia (Cooley and Rietti-Greppi-Micheli)
- (ii) Acquired

  Nocturnal haemoglobinuria (Marchiafava Micheli)

(d) Secondary to splenomegaly

General Principles of Treatment

Although specific measures exist for the correction of many forms of anaemia, there are certain general principles, observance of which is essential in the management of all anaemic patients

[illegible]

patient's response to haematinics is often more rapid and more complete when he is at rest. It is a wise general rule for the patient to remain in bed until the haemoglobin level reaches 65 per cent and for activity then to be steadily and gradually increased.

haematinic value and will lessen the appetite for those foods which possess it. The manner in which food is served must be adapted to the tastes of the individual as well as to his state of health.

with a simple laxative such as aloes or an enema as required.

Finally, a number of factors may impair the function of the bone marrow whatever the primary cause of anaemia. Amongst these must be included infections, whether overt such as pulmonary tuberculosis, or cryptic such as symptomless bacilluria, malignant disease, such chronic disorders as cirrhosis of the liver; chronic nephritis; rheumatoid arthritis, endocrine disorders, particularly myxoedema; and possibly senility. These must be sought and, when possible, brought under control by appropriate means.

ANAEMIA DUE TO DEFICIENCY OF IRON

Iron is a constituent of haemoglobin and the main consequence of its deficiency is failure of haemoglobin synthesis. The feature of the resulting anaemia is a reduction in the blood's content of haemoglobin, disproportionate to the fall in the,

corpuscular haemoglobin concentration, a figure which expresses as a percentage the ratio between the quantity of haemoglobin in grammes per 100 millilitres of blood and the volume of cells in which it is contained The normal value is 32–36 per cent and, with the sole exception of Mediterranean anaemia, a figure below 30 per cent always indicates a deficiency of iron.

The management of all deficiency states is based on two general principles: control of the factors responsible for depletion, and replenishment of the body's

stocks by administration of the substance in question These principles must be observed in the treatment of hypochromic anaemia

CAUSATION

The causes of iron deficiency are inadequate intake of iron, impaired absorption, and increased loss It is clearly important to remedy the first by improving the diet, but active treatment of the anaemia is also necessary Impaired absorption is commonly due to achlorhydria, sometimes combined with the disturbance of

towards the end of menstrual life in whom an inadequate diet, combined with achlorhydria and repeated pregnancies, has eventually resulted in deficiency of iron).

Only when the reasons for depletion are understood should the deficiency be repaired by administration of iron. This caution is imperative, for a carcinoma of the colon may be overlooked in the satisfaction of seeing the anaemia accompanying it relieved

INDICATIONS FOR BLOOD TRANSFUSION

If the degree of anaemia appears to

repair anaemia rapidly before operation

ADMINISTRATION OF IRON

When the requirements mentioned above have been met

of preparations but ferrous salts are more effective weight for weight than ferric

salts Witts (1936) has introduced the useful notion of the average effective dose or that quantity of an iron preparation which, when taken daily, leads to an increase in the haemoglobin level of over 1 per cent a day during an observation period of 25–40 days starting from an initial reading of less than 50 per cent. Table I gives the average effective doses of the commonly used preparations Ferrous sulphate is perhaps the form in which iron is most widely prescribed and it is a satisfactory preparation for routine use in the form of tabella ferri sulphatis, 3 grains, thrice daily, after meals

TABLE I

DAILY AVERAGE EFFECTIVE ORAL DOSE OF COMMON PREPARATIONS OF IRON
(After Witts 1936)

Reduced iron	23–90 gr	1 5–6 0 g
Ferrous chloride	4–8 gr	0 25–0 5 g
Exsiccated ferrous sulphate	9 gr	0 6 g
Ferrous lactate	23 gr	1 5 g
Pill of iron carbonate (Blaud s pill)	45–60 gr	3–4 g
Solution of ferric chloride	120 min	8 ml
Iron and ammonium citrate	60–120 gr	4–8 g
Ferric hydroxide (Solution of Colliron)	180–360 min	12–24 ml

A certain proportion of patients taking iron will complain of digestive symptoms epigastric pain, distension, diarrhoea, constipation, and, rarely, vomiting In the *majority tolerance is acquired readily if a small dose is prescribed initially and* gradually increased The colloidal preparations of iron hydroxide are well tolerated by almost all patients

Effects

The effect of iron treatment is shown first by a rise in the reticulocyte count which reaches a peak about the tenth day, following this the haemoglobin content starts to increase and continues to rise at a rate of 1–2 per cent daily, until the *tempo*
s
c
F
f
c
element from the alimentary tract is inadequate, achlorhydria or gastric resection is often responsible In a proportion of these patients the administration of 200 milligrams of ascorbic acid *with each dose of iron will enhance uptake and* a satisfactory rise in haemoglobin will follow This effect is due to the reducing action of ascorbic acid *maintaining iron in the ferrous state*

Parenteral injections

There will remain a residuum of patients in whom hypochromic anaemia is resistant to oral medication with iron, in these cases parenteral injection becomes necessary A preparation of saccharated iron oxide is now available which can be given safely by intravenous injection in adequate dosage, 5 millilitres of this

solution (Ferrivenin) contain 100 milligrams of metallic iron It is advisable to give a preliminary dose of 1 millilitre, if there are no signs of intolerance, this is followed the next day by 2 millilitres and then by 5–10 millilitres daily until the required amount has been given The symptoms which may arise are palpitation, praecordial discomfort, a metallic taste, tachycardia, drowsiness and collapse They have only occurred in the author's experience with a rapid injection of large

each 1 per cent gain in haemoglobin level desired Thus for a haemoglobin reading of 50 per cent to be raised to 100 per cent, 1,250 milligrams of iron are required A surplus will be needed to restock the storage depots it is estimated that in the average adult these contain about 1 3 grammes of iron, but it is probably not necessary to give more than half this quantity

Maintenance treatment

suffered gastric resection, that the necessity most frequently arises In the absence of such causes, medication can safely be withheld for 4–6 weeks after normal levels have been reached, when it may be assumed that the storage depots have been replenished It is advisable for the patient to be kept under surveillance, and for regular examinations of the blood to be made for a further 6 or 9 months, to be certain that there is no relapse

ANAEMIAS DUE TO DEFICIENCY OF LIVER PRINCIPLE AND RELATED SUBSTANCES

Introduction

An anaemia in which the mean size of the erythrocytes is increased and in which

as due to a deficiency of the active principle of liver

Foremost in the group is Addisonian pernicious anaemia, and it was the discovery by Minot and Murphy (1926) of the curative effect of liver in patients with

in the alimentary tract. One of these—the intrinsic factor—was secreted by the healthy gastric mucosa, the other—the extrinsic factor—was present in the normal diet. A deficiency of the liver principle could arise by the absence of the extrinsic factor from the diet, by failure of the stomach to secrete the intrinsic factor or by defective absorption of the principle itself from the alimentary tract. On this basis it was possible to explain satisfactorily most of the anaemias in question · pernicious

caused by defective absorption, and the anaemia of *Diphyllobothrium latum* infestation was due to the worm's interference with the interaction of the intrinsic and the extrinsic factors

the demonstration that the anaemias could be relieved and the bone marrow restored to normal by small doses of folic acid, a substance of known chemical constitution and subsequently synthesized, although the most refined liver extracts active in pernicious anaemia contained virtually none of this substance Folic acid, moreover, was found to have no effect on the nervous system degeneration so frequently associated with pernicious anaemia, although liver extract would arrest its progress or prevent its development Later it was shown that thymine, a simple chemical product known for fifty years, would also relieve the anaemias of this group A

Observation has now outrun interpretation and, although Castle's original experiments have been amply confirmed, his hypothesis is clearly no longer acceptable in the form in which he stated it The interrelation of the various factors described above is as yet unsettled and a satisfactory explanation of the aetiology of these anaemias is still awaited

THERAPEUTIC SUBSTANCES AVAILABLE

Liver and liver extracts

Raw liver —This is seldom used now but it was the original method of treating pernicious anaemia, it was employed in quantities of 8 ounces daily, variously prepared and flavoured

Extracts for oral administration —These extracts are now rarely prescribed as

Proteolysed liver for oral administration —Proteolysed liver was introduced first

Liver (Allen and Hanbury) are satisfactory preparations

Extracts for parenteral injection —Extracts for parenteral injection are usually classified as "crude" and "refined" In general terms a crude extract is one which has undergone the smallest amount of processing necessary to make it safe for

injection; it contains a relatively large quantity of material other than the active

grammes of liver. It does not follow from these definitions that all crude or all refined extracts are comparable As a general rule it may be said that refined extracts are active in pernicious anaemia, but frequently inactive in other forms of megaloblastic anaemia, while crude extracts are effective in both It has recently been claimed that refined extracts are as effective as crude preparations in nutritional megaloblastic anaemia Dosage is discussed in a later paragraph.

Vitamin B_{12}

Rickes, and his colleagues (1948a), in the United States of America, and Smith (1948) in Great Britain, have recently isolated from liver a red crystalline substance, curative of pernicious anaemia when given parenterally in minute doses. The American workers named this substance vitamin B_{12} and showed that it was active, not only in pernicious anaemia, but also in nutritional megaloblastic anaemia and

workers had made use of Shorb's (1947) observation that *Lactobacillus lactis Dorner* would only grow in certain synthetic media when liver extract was added The power of any extract to promote this organism's growth ran parallel to its activity in pernicious anaemia, and she postulated that this growth factor and the anti-anaemic principle were identical It was later shown that vitamin B_{12} could replace liver extract as a growth factor and her suggestion appears to have been correct Rickes and his colleagues (1948b) subsequently found that, when *Streptomyces griseus* was grown in fluid media, a substance was elaborated as active as vitamin B_{12} in promoting the growth of *L lactis Dorner* This substance has been isolated and appears to be identical with vitamin B_{12} and as active in the treatment of pernicious anaemia

B_{12} The average maintenance dose is 40 micrograms a month intramuscularly It is not effective in pernicious anaemia of pregnancy and achrestic anaemia, in the megaloblastic anaemias of steatorrhoea and of nutritional deficiency its effect is variable and pteroylgutamic acid is the drug of choice

Yeast preparations

Marmite and other yeast preparations are effective by mouth in tropical nutritional megaloblastic anaemia and sometimes, when given in large doses, in pernicious anaemia The active principle is commonly held to be the extrinsic factor but

it has defied isolation and identification These substances have little practical use except in nutritional megaloblastic anaemia

Preparations of hog's stomach

Desiccated hog's stomach is effective when taken by mouth in pernicious anaemia and it has proved possible to concentrate the active principle which Wilkinson has named "haemopoietin" It is believed to be identical with the intrinsic factor The preparations sold commercially are not concentrated, they are dispensed as a fine powder One or two tablespoonfuls daily is the average dose required The product is nauseating but its taste can be disguised by ginger beer

Folic acid (pteroylglutamic acid)

During the past two or three years the story of this interesting compound has frequently been told Pteroylglutamic acid can now be synthesized and it has proved effective in the relief of all the megaloblastic anaemias in doses as small as 15–30 milligrams daily The first flood of enthusiasm for pteroylglutamic acid as a practical method of treating patients with pernicious anaemia was abruptly stemmed by the observation that it had no effect on the nervous system degeneration accompanying this disease Reports suggest that it may even provoke an explosive onset of nervous symptoms There is no doubt that in many patients sub-

[illegible]

of megaloblastic anaemia in which nervous system degeneration does not occur Ten milligrams of folic acid, twice daily, by mouth is a satisfactory routine dosage

Various compound preparations

Numerous preparations are marketed containing mixtures of iron liver extract, pteroylglutamic acid, and assorted vitamins There is no theoretical justification for their use and, as they commonly contain inadequate doses of all their ingredients, they have no place in rational therapeutics

Dosage

One of the difficulties in discussing dosage of liver principle and the related substances has been the lack of any method of assay other than clinical trial *The British Pharmacopoeia* recognizes no "unit", in the United States of America a unit is defined as that amount of the agent which, when given daily to a patient with uncomplicated pernicious anaemia in relapse, produces an 'average' reticulocyte response The Canadian unit is one seventh of the weekly dose of the agent needed to produce a satisfactory increase in the erythrocyte count In Great Britain dosage must be guided by the manufacturer's recommendations and the physician's experience

It may be that the isolation of vitamin B_{12} has solved the difficulty of assay The potency of liver extracts in promoting the growth of *L lactis Dorner* can be estimated and on this basis their presumed content of vitamin B_{12} can be expressed It

remains to be proved that this test is completely specific and that a liver extract's activity depends solely on the amount of this vitamin it contains If this can be established, it is probable that preparations of the pure vitamin will supplant liver extracts in the treatment of these anaemias

ADDISONIAN PERNICIOUS ANAEMIA

There are two phases in the management of a patient with pernicious anaemia initial treatment and maintenance therapy The necessity of establishing the diagnosis firmly before undertaking treatment cannot be stressed too strongly; it is essential to show that there is a megalocytic anaemia with a megaloblastic bone marrow and complete achlorhydria and that no other cause for such anaemia exists Unless these precautions are taken, serious disease may be overlooked until it is irremediable, an unjustifiably optimistic prognosis may be given, or at best a patient condemned to unnecessary injections of liver for the rest of his life

Preliminary treatment

Initial treatment is best undertaken with the patient at rest in bed until the [illegible]

the anaemia, as by the presence of signs of circulatory failure or of mental changes attributable to cerebral anoxia If there is generalized oedema with venous conges- [illegible]

for blood transfusion may be the presence of some complication, such as an infection, likely to interfere with the response to liver treatment.

Treatment with liver

Bearing in mind the reservations mentioned above, treatment with liver may be started immediately The method of choice is by injection of a liver extract it is more certain, for the active principle has no need to run the gauntlet of impaired absorption from an abnormal alimentary tract, it is more convenient, and it is cheaper In general, a refined extract of established potency is best used, depending on the preparation, injections, probably of 1–2 millilitres, repeated at intervals of a fortnight, will ensure a maximal therapeutic response The presence of nervous system degeneration is held by some to indicate the necessity for a crude extract, [illegible]

bilirubin figure falls to normal In the peripheral blood, the first change is a rise in the number of reticulocytes which reach a maximum between the fourth and tenth days, thereafter falling rapidly to normal This reticulocyte crisis is followed by a

steady rise in the erythrocyte count and the haemoglobin level The height of the reticulocyte peak depends on the initial erythrocyte count and is often used to

approached but whatever the initial count the erythrocytes should number 5,000 000 per cubic millimetre and the haemoglobin reading should be 100 per cent by the end of the eighth week Tables II and III show the reticulocyte levels and *rates of improvement to be regarded as satisfactory with various initial counts*

TABLE II

RED CELL COUNTS FOLLOWING INTRAMUSCULAR INJECTION OF LIVER EXTRACT

(Isaacs and Friedman 1938)

Initial erythrocyte count (millions per c mm)	Expected maximum reticulocyte percentage
0 5	56 8
1 0	40 0
1 5	28 0
2 0	19 0
2 5	12 0
3 0	6 4

TABLE III

WEEKLY RED CELL COUNTS FOLLOWING INTRAMUSCULAR INJECTION OF LIVER EXTRACT

(Isaacs and his colleagues 1938)

Initial erythrocyte count in 1 × 10⁶/c mm	Weekly erythrocyte count in 1 × 10⁶/c mm after treatment							
	1st	2nd	3rd	4th	5th	6th	7th	8th
4 5	4 58	4 70	4 75	4 80	4 85	4 90	4 95	5 00
4 0	4 16	4 35	4 50	4 60	4 70	4 80	4 90	5 00
3 5	3 75	4 10	4 25	4 40	4 55	4 70	4 80	5 00
3 0	3 40	3 75	4 00	4 20	4 40	4 60	4 75	5 00
2 5	2 95	3 40	3 75	4 00	4 25	4 50	4 75	5 00
2 0	2 50	3 10	3 50	3 80	4 10	4 40	4 70	5 00
1 5	2 10	2 70	3 25	3 60	3 95	4 25	4 65	5 00
1 0	1 70	2 40	3 00	3 40	3 74	4 20	4 60	5 00
0 5	1 30	2 10	2 70	3 20	3 70	4 10	4 55	5 00

Infection of the urinary tract is a common cause of an inadequate response to treatment in elderly women and the possibility of this complication should always be remembered

Maintenance treatment.—The aim of maintenance treatment is to preserve a normal blood picture This phase requires careful definition, and for this purpose it may be said to infer an erythrocyte count above 4,500,000 per cubic millimetre, a haemoglobin level above 95 per cent, and a mean corpuscular volume below 100 cubic microns The dose of liver extract and the frequency of injection needed to

be necessary Any intercurrent infection, even a common cold, will increase the requirements.

Indications for oral use—The indications for using an oral preparation are few. A small proportion of patients will refuse injections and occasionally sensitivity to

liver are the two most satisfactory oral preparations

liver extract With these criteria as a guide patients with pernicious anaemia can be maintained in excellent health, neuritic symptoms will improve and in most cases will disappear entirely after 6–24 months of adequate treatment, damage to the spinal cord is irreversible, but with full doses of liver extract the lesions cease to progress and it is not rare to find the plantar reflexes restored from extensor to flexor

Sensitivity—The occasional appearance of sensitivity to injections of liver

brand of extract and reactions will usually be found to occur with all preparations When reactions are mild it is sometimes possible to continue injections if adrenaline is added to the extract or if one of the antihistamine drugs is given beforehand If severe, the alternatives are to continue treatment with an oral preparation, to

is given 15–30 minutes later and this rate of increase is maintained at the same intervals of time until the required dose has been reached The larger doses are injected subcutaneously The final dose is repeated daily for 3 days and then once a week for 6 weeks, thereafter maintenance treatment can be safely continued with injections at intervals of 3–4 weeks.

Combined with other preparations—Occasional patients are seen in whom pernicious and hypochromic anaemia coexist These will require medication with iron, as well as with liver, after the reason for the iron deficiency has been elucidated.

The appearance of hypochromic anaemia in a patient with pernicious anaemia, previously well controlled, is often the first sign of carcinoma of the stomach. It is established that this tumour is three times more common in patients with pernicious anaemia than in others; it is a wise precaution to examine the stomach radiologically once a year.

Other medication in pernicious anaemia is seldom needed; it is the general experience that all symptoms disappear after adequate treatment with liver extract. In the rare instances in which dyspepsia persists and in which gastric carcinoma has been excluded it is reasonable to prescribe Dilute Hydrochloric Acid (*B.P.*) in doses of 120–240 minims, to be taken in a fruit drink with meals 3 times daily. This is usually effective in controlling such digestive disturbances. There is no indication for the exhibition of hydrochloric acid as a routine in pernicious anaemia.

The treatment of subacute combined degeneration of the spinal cord is considered *in detail in the section on the Central Nervous System* *(see page 257)*.

OTHER MEGALOBLASTIC ANAEMIAS

Pernicious tapeworm anaemia

This anaemia, due to infestation with *Diphyllobothrium latum*, has all the charac-

provided the worm has been expelled, maintenance treatment is not necessary.

Megaloblastic anaemia of sprue and other steatorrhoeas

The treatment of anaemia is but part of the management of these disorders

Tropical and other nutritional megaloblastic anaemias

These conditions are commonly attributed to a deficiency of the extrinsic factor in the diet. The fundamental maintenance treatment is, therefore, to ensure that the patient's diet is adequate. Initially some more rapid method of repairing the anaemia is required: large doses of Marmite by mouth, crude liver extracts by parenteral injection and pteroylglutamic acid are all equally effective. The two last-named are the more convenient. Injections of vitamin B_{12} have been found to relieve the anaemia.

Megaloblastic anaemia of pregnancy

Megaloblastic anaemia of pregnancy responds satisfactorily to liver extracts and to pteroylglutamic acid. It should be noted that all macrocytic anaemias of preg-

Megaloblastic anaemias of gastro-intestinal disease and operations

degeneration

ANAEMIA DUE TO DEFICIENCY OF OTHER FACTORS

Ascorbic acid

considered in the appropriate section

Thyroid secretion

Both hypochromic and pernicious anaemia are met with in myxoedematous patients, this association is a reason for failure of the specific haematinics in some instances Rarely hypothyroidism is accompanied by a moderate macrocytic anaemia which is repaired only when some preparation of thyroid is administered

ANAEMIA DUE TO MYELOPHTHISIC PROCESSES

A number of conditions exist in which a metastatic or dysplastic cellular proliferation *occupies the bone marrow to the exclusion of the normal haemopoietic* elements Familiar examples are furnished by leukaemia, myelomatosis and metastatic carcinomatosis, less common instances are myelosclerosis and the osteosclerosis of Albers-Schönberg Anaemia, which may be profound, is the consequence but, although the myelophthisic process is in the main responsible, evidence of excessive haemolysis can sometimes be found

The rational treatment is clearly that of the causative condition, but in most cases this is ineffective. Temporary improvement follows blood transfusion provided the haemolytic factor is not prominent. Particularly in myelosclerosis, in which the course is often prolonged, a normal haemoglobin may be maintained for many months after transfusion In generalized carcinomatosis—with the exception of that originating in the prostate—and myelomatosis, profound anaemia is a herald of the end and energetic treatment is only officious When it is considered advisable to relieve the anaemia, repeated transfusions of packed red blood cells or of fresh blood should be given until the haemoglobin level is between 80 and 85 per cent.

PRIMARY REFRACTORY ANAEMIA

of the bone marrow is reduced and the term "aplastic anaemia" has long been applied to such cases, however, in a proportion of patients with this blood picture the bone marrow is of normal, or even increased, cellularity; on the other hand, in

some patients with an "aplastic" bone marrow the blood may show phenomena such as reticulocytosis and the presence of normoblasts or immature leucocytes,

tions the clinical course is one of deterioration, punctuated perhaps by transient remissions, and in none is there a response to any of the known haematinic drugs It seems proper in the present state of knowledge to discuss the treatment of this group of disorders on the assumption that they are variants of the same pathological process

A certain number of cases of primary refractory anaemia follows exposure to agents known to have a noxious action on haemopoietic tissues, these may be chemical, such as benzol, arsphenamine and gold compounds, or physical, such as radium or x-irradiation In the remainder the cause of the process is unknown

Treatment

Treatment consists, first, of removing the patient from the influence of any noxious agent, and careful inquiry must be made in every case before it is assumed

in those with macrocytosis and with a cellular bone marrow, than in the classical examples of aplastic anaemia Repeated blood transfusion is the foundation of treatment, in the more indolent forms of the disease a massive transfusion of fresh blood may enable the patient to maintain for many months a haemoglobin level compatible with normal activity, when the course is more rapid, weekly transfusions may be needed Every effort must be made to raise the haemoglobin reading to 80–85 per cent and to keep it at this figure

Additional threats to life in refractory anaemia are provided by the granulocytopenia and the thrombocytopenia The liability to infection which accompanies the first can be largely controlled by the administration of penicillin in full doses immediately there is any suggestion of an infective process The haemorrhagic tendency may be lessened by blood transfusion but may still defy complete alleviation

In a proportion of these patients reticulocytosis and an increased excretion of urobilinogen bear witness to excessive haemolysis In these cases, particularly when there is splenomegaly and the bone marrow is not acellular, splenectomy may be advisable In carefully chosen cases this operation is followed by prolonged remission

By these measures the lives of patients with refractory anaemia can undoubtedly be prolonged, the prognosis in those cases due to a known noxious agent is greatly improved, and a ray of hope may be discerned for the more indolent examples of the disease

SECONDARY REFRACTORY ANAEMIAS

This term is used to denote certain dyshaemopoietic anaemias which are resistant to haematinics and are associated with infections and metabolic disturbances

Chronic infections

Many chronic infective processes are accompanied by an anaemia which is commonly normocytic and normochromic, unless coexistent iron deficiency results in hypochromia Medication with haematinics does not lead to an improvement but the blood returns to normal when the infection subsides The basis of treatment is clearly to control the infection but, when the infecting organism is resistant to chemotherapy and the antibiotics, an impasse may be reached The infection maintains the anaemia, and the anaemia hampers recovery from the infection

circle

Renal failure

ment in the kidney's function or by blood transfusion The latter is undesirable when there is no likelihood of even temporary improvement of renal function but, when this exists, raising the haemoglobin to normal levels by transfusion will not only relieve symptoms due to anaemia, but may temporarily increase efficiency of the kidney With prolonged anaemia and hypertension there is particular danger of blood transfusion overloading the circulation

Cirrhosis of the liver

A macrocytic, but not megaloblastic, anaemia commonly accompanies failure

temporary benefit on the patient and relief of anoxia may improve hepatic function

HAEMOLYTIC ANAEMIAS

Introduction

Haemolytic anaemia is the consequence of blood destruction outstripping blood formation The heightened *tempo* of haemolysis may be due to some congenital or acquired abnormality of the erythrocytes decreasing their longevity; to the presence in the circulation of lytic substances, or apparently to an increased avidity on the part of the spleen If blood formation is depressed, a minor increase in blood destruction becomes of importance this combination is to be observed sometimes in chronic lymphatic leukaemia and primary refractory anaemia

Two syndromes may be recognized, depending on the speed of haemolysis In the first, sudden disruption of circulating erythrocytes floods the plasma with free haemoglobin, haemoglobinuria and a phase of circulatory collapse, termed ' haemolytic shock", follow, and are succeeded by anuria which may terminate in fatal renal

failure This sequence is the rule in incompatible blood transfusion and may occur in blackwater fever, arsine poisoning, and acute haemolytic anaemia of unknown

familial acholuric jaundice and chronic haemolytic anaemia of unknown cause

PRINCIPLES OF MANAGEMENT

There are certain general principles applicable to the management of all types of haemolytic anaemia The first is to treat haemolytic shock this need arises only in the fulminating haemolytic states mentioned and the indication is for transfusion of fresh blood or plasma The first is preferable, but plasma should be used if the accuracy of blood grouping is in doubt The second is to remove or neutralize the cause of haemolysis this is only possible when the haemolytic principle is an exogenous poison, such as lead, phenylhydrazine, arsine, or a sulphonamide drug, or when an infective agent, such as the malarial parasite, is responsible If it is impossible to observe this second principle, an attempt must be made to restore the equilibrium between blood formation and blood destruction In some instances an abrupt readjustment will follow blood transfusion, perhaps by virtue of the normal antihaemolysins of the transfused blood In others, when deterioration continues in spite of transfusion, splenectomy will be necessary The spleen often plays a major part in maintaining the disequilibrium, sometimes its role is secondary, consisting of the removal from the circulation of damaged or malformed, although functionally adequate, erythrocytes, at other times, an enlarged spleen appears to be responsible for the sequestration and destruction of normal cells, in either case, removal of the spleen may abolish anaemia by tipping the balance in favour of blood formation Finally, every effort must be made to maintain an adequate haemoglobin level by means of repeated blood transfusion

The application of these principles to the treatment of the various forms of haemolytic anaemia requires more detailed discussion

FAMILIAL ACHOLURIC JAUNDICE

It is generally accepted that the basis of this disorder is an inherited and innate

results

Splenectomy is curative and should be recommended whenever the disease has given rise to symptoms *It is not rare to encounter members of affected families in* whom there is increased fragility of the erythrocytes, but no jaundice, anaemia, or splenomegaly, in them splenectomy is, of course, unnecessary Intermediate between

gall bladder At splenectomy the surgeon should be asked to examine the biliary

system The question of cholecystectomy or cholecystotomy must be left to his discretion, but it should be stressed that removal of the spleen and gall bladder at the same time substantially increases the risks of the operation, and may prove too great a burden for a patient who has for many years been anaemic

The place of blood transfusion in familial acholuric jaundice is to make the patient fit for splenectomy The dangers of reaction have been repeatedly stressed but it is likely that, in this particular form of haemolytic anaemia, they have been exaggerated Fresh blood of homologous ABO and Rh groups should be used It is unwise to attempt splenectomy with a haemoglobin reading below 70 per cent

Haemolytic Anaemias of Unknown Cause

Acute

Haemolytic anaemias, often associated with the names of Brill and Lederer, probably arise from the presence in the patient's blood of haemolysins of the [illegible]

In brief, it may be said that some of these patients recover spontaneously; in some cases, blood destruction comes to a halt after one or more blood transfusions, splenectomy results in the cure of others, and in some instances no therapeutic measures will abate the fury of the haemolytic process

If there is haemolytic shock, transfusion of fresh blood of homologous ABO and Rh groups, or of plasma, must be undertaken immediately It will also be necessary if the haemoglobin level is below 50 per cent and falling steadily Otherwise it is advisable to await developments The effect of blood transfusion is unpredictable [illegible]

lytic process will flicker out spontaneously, it is better to allow it to do so, but if a period of observation shows this conclusion to be unlikely, the effect of transfusion must be tried

If haemolysis proceeds, unchecked by transfusion, splenectomy must be advised The results of the operation are uncertain in a proportion there is immediate remission, in other cases steady improvement begins after the lapse of a few days or weeks, in some patients it is without effect Sometimes the remission is temporary and an episode, such as a common cold, rekindles the haemolytic process

Transfusion in this disorder must be undertaken with care the blood should be fresh and must be of homologous ABO group, for O group blood may contain sufficient α or β agglutinin to cause lysis of the recipient's sensitized cells Determination of the Rh group is essential, because repeated transfusions may be required The serum of such patients may contain irregular agglutinins, especially [illegible]

37° C. for 30 minutes, to make certain that the former contains no lysins for the donor's cells.

Chronic

In chronic haemolytic anaemia, sometimes spoken of as acquired acholuric jaundice of Hayem and Widal, treatment should follow similar lines to that described for the acute form, that is, a period of observation, a cautious trial of the effect of transfusion, and, if it is clear that haemolysis is unchecked, splenectomy Although the effects of this operation are uncertain, it often offers the patient his only chance of survival and there should be no hesitation in advocating it in the circumstances described It relieves the anaemia in perhaps 50 per cent of cases

HAEMOLYTIC ANAEMIA DUE TO EXOGENOUS LYSINS

This group includes haemolysis due to such infections as malaria and Oroya fever and to the numerous drugs and other chemical substances known to cause blood destruction Treatment entails the recognition and removal of the offending substance or control of the causative infection Transfusion is required if the haemoglobin level has fallen dangerously low

Blackwater fever may be regarded as an acute haemolytic anaemia occurring in those infected with falciparum malaria, its treatment is considered in the section dealing with Malaria

HAEMOLYTIC ANAEMIAS DUE TO ENDOGENOUS LYSINS OF IMMUNE BODY TYPE

The haemolytic anaemia of the newborn and incompatible transfusion are discussed in the appropriate sections Paroxysmal haemoglobinuria *e frigore* is almost always of syphilitic origin, it seldom leads to significant anaemia Energetic treatment of the causative infection will usually relieve the symptoms, although the serological abnormalities may persist

HAEMOLYTIC ANAEMIAS DUE TO ABNORMALITIES OF THE ERYTHROCYTE

The treatment of sickle-cell anaemia and Mediterranean anaemia is unsatisfactory Blood transfusion will usually maintain a reasonable haemoglobin level, but it often needs frequent repetition Splenectomy is generally held to be useless in the first ... prolong the beneficial effect of transfusion

a minor decrease in pH may occasion haemolysis There is no effective treatment and splenectomy is inadvisable Blood transfusion may be required to combat anaemia, but it is no more than palliative Transfusion of whole blood may cause an abrupt increase in the rate of destruction of the recipient's cells, the same is true

HAEMOLYTIC ANAEMIA SECONDARY TO SPLENOMEGALY

Splenomegaly of almost any cause may be accompanied by haemolytic anaemia this has been noted in lymphatic leukaemia, Hodgkin's disease, reticulosarcoma, Gaucher's disease, congestive splenomegaly, and various other morbid processes

leading to outstanding splenic enlargement The mechanism of the haemolysis is ill-understood it has been suggested that cells are sequestrated in the circulatory

orders such as Gaucher's disease and in some cases of Hodgkin's disease splenectomy will offer the patient some years or months of reasonable health and should be seriously considered

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CHRONIC CONGESTIVE SPLENOMEGALY (BANTI'S SYNDROME)

A group of diseases has long been recognized in which splenomegaly, leucopenia and thrombocytopenia, with or without anaemia, are accompanied by a tendency

syndrome is the result of

70 per cent of these cases

the obstruction, in others abnormalities of the portal vein or splenic thrombophlebitis are responsible. This form of splenomegaly is therefore a consequence of splenic venous hypertension which, except for the rare instances due to thrombosis of the splenic vein, is only part of a general rise of venous pressure throughout the portal system, it is followed by dilatation of veins affording communication with the systemic circulation, particularly in the lower part of the oesophagus. Rupture of, and haemorrhage from,

bone marrow For this clinical picture the most satisfactory term is chronic congestive splenomegaly

DIAGNOSIS

oesophagoscopy will be required to confirm the existence of oesophageal varices. The second step is the separation of those cases due to hepatic fibrosis from those in

which the venous obstruction is outside the liver. In the first, the increase in portal venous pressure is often of subsidiary importance to the progressive disease of the liver which occasions it, in the second, the lesion may be significant only by virtue of its causing venous obstruction

The usual physical signs of "hepatic cirrhosis" may indicate that disease of the

course in respect of hepatic function, and it is the raised pressure in the portal system which threatens existence. In such circumstances attempts to reduce it are justifiable, particularly if there is a history of haematemesis The absence of liver *disease connotes extrahepatic obstruction, and treatment, for the reasons indicated,* is even more desirable.

SURGICAL MEASURES

When the decision has been made, responsibility for the relief of portal hypertension passes to the surgeon. Preliminary exploration of the abdominal cavity is essential the liver should be inspected for evidence of cirrhosis and biopsy may be justifiable, pressure readings should be taken in the splenic and superior mesenteric veins and the splenic vein carefully examined Congestive splenomegaly due to thrombosis of, or other obstruction to, the splenic vein demands splenectomy; the venous return from the spleen is alone responsible for oesophageal varices in these

transformation or a congenital stenosis of the portal vein is probably responsible

The choice before the surgeon is to by-pass the obstruction by anastomosis of portal and systemic veins, or to control the liability to haemorrhage by obliterating the oesophageal varices It cannot yet be said which operation will prove to give the better results The venous anastomoses which have been undertaken include an end-to-side junction of the portal vein and the inferior vena cava, a side to-side junction of these two veins, an end-to-end junction of the splenic and left renal veins, after excision of the spleen and *left kidney, and an end-to-side spleno-renal junction* after splenectomy, but with preservation of the left kidney. The second of these methods has much to recommend it, for it preserves the continuity of the portal

oesophagus is stripped of all its veins, each vessel being [illegible]
Haematemesis is prevented but portal hypertension is not reduced

[illegible]

portal hypertension, but the approach to the problem is logical and reports of its application are encouraging.

TREATMENT OF HAEMORRHAGE

[illegible]

TREATMENT OF ANAEMIA

[illegible]

indication that the organ's metabolic functions are impaired, it improves with restoration of hepatic efficiency. Rarely a haemolytic anaemia, secondary to splenomegaly, is a feature of this syndrome if severe, it may load the scales in favour of splenectomy.

GLANDULAR FEVER

Glandular fever is a disease of unknown cause, although it has the hall-marks of an infection It is characterized by enlargement of lymph nodes, splenomegaly, fever, and lymphocytosis Sore throat is a common accompaniment; skin rashes occur in about 10 per cent of cases, less commonly hepatitis and meningo-encephalitis complicate the disease.

Infectivity is probably greater than is generally believed, for there is evidence that asymptomatic infection is common The course is almost invariably benign but convalescence is often protracted.

[illegible]

patients complain of lassitude for weeks afterwards

There is no drug known to affect the disease process, but convalescent serum has been used in doses of 50–300 millilitres and claims have been made that it will reduce fever and prevent complications Penicillin and the sulphonamide drugs will control the tonsillitis which complicates some 30–40 per cent of cases, and penicillin lozenges are useful in the acute gingivitis sometimes present. Other complications require symptomatic treatment.

THE HAEMORRHAGIC STATES

INTRODUCTION

The immediate consequence of a scratch or trivial cut in which no sizeable vessel is severed, is a free flow of blood, after a few minutes this is arrested, mainly by retraction and contraction of the injured capillaries, but also by the formation of platelet thrombi at the cut ends of the vessels The blood remaining in the wound clots, and after the lapse of a few minutes *the coagulum shrinks to form a firm occlusive plug* Between 2 and 5 hours from the original injury the capillaries dilate to initiate the process of healing by granulation, the firm clot which has formed in the interval being sufficient to prevent further bleeding

The agencies *controlling the vascular aspect of this response to injury are un*known It has been suggested that the platelets may neutralize histamine like substances which favour vasodilatation, but the evidence is unconvincing It is known that adequate supplies of vitamin C are necessary to maintain the integrity of the vascular endothelium, and it has been claimed that vitamin P (hesperidin) and rutin have a like function

The process of coagulation is a complex physico-chemical phenomenon of

simplification, the process is incompletely understood and is certainly of far greater complexity than is indicated

The function of the platelets is one of the mysteries of haematology These elements, normally present in the blood in numbers between 200 000 and 300 000 per

vascular walls, it has been suggested that they have a vasoconstrictor influence Nevertheless the relation between a reduction in the platelet count and the appearance of purpura, although it must be admitted cannot be satisfactorily explained

Based on this brief description of the physiology of haemostasis, a classification of the haemorrhagic states is as follows

- Faults in the vascular mechanism
  - Hereditary haemorrhagic telangiectasia
  - Non thrombocytopenic purpuras
  - Deficiency of vitamins C and P (?)
- Faults in the coagulation mechanism
  - Absence or deficiency of fibrinogen
    - Congenital
    - Due to defective formation—liver disease
  - Deficiency of prothrombin
    - From deficiency of vitamin K
      - Obstructive jaundice and biliary fistula
      - Gastro-intestinal disorders
      - Congenital
    - Inadequate synthesis in liver disease
      - Parenchymatous disease of liver
    - Effects of dicoumarol
    - Idiopathic
  - Excess of anticoagulants
    - Haemophilia, ? antithromboplastin
    - Heparin
- Haemorrhagic states of uncertain nature
  - Thrombocytopenic purpura

GENERAL PRINCIPLES OF MANAGEMENT

The disturbances of haemostasis are so many and so varied that it is difficult to lay down general principles for their management Clearly, if a bleeding tendency is capable of correction the specific treatment should be applied and the patient restored to health, but there are certain general points in treating the victims of chronic incurable haemorrhagic states which require mention

Preventive Treatment

If the bleeding tendency is insusceptible of control, it is obvious that the patient should be protected from the minor injuries incidental to normal existence A child should not play games, nor ride a horse or a bicycle if the haemorrhagic state is severe Against these dangers must be weighed others more subtle but as real the isolation and unhappiness of the child who is made to feel different from the herd, over solicitude, and parental anxiety can combine to confirm the patient's belief in his own inadequacy A balance can usually be struck and with wise guidance a full and happy life is possible within the limits imposed by the disease The eugenic aspects of the inheritable diseases are of obvious importance, but it requires a doctor more interested in the race than in the individual to impose the additional burden of celibacy or childlessness on his patient In the rare instances of hereditary haemorrhagic states in women the dangers of childbirth, or even of defloration, must be remembered

Treatment of Anaemia

Blood transfusion has specific therapeutic applications in some of these disorders and these are considered later; it is often necessary when haemorrhage has resulted in anaemia For those patients with chronic anaemia, iron should be prescribed and the general measures, described in the section on Anaemia, instituted.

In any of these conditions a haemorrhagic state will supervene when the prothrombin content of the plasma, judged by the "prothrombin time", falls below 20 per cent of normal Loss of blood at operation may be sufficient to reduce the

transfusion is given for this purpose, for most observers have found the prothrombin activity of stored blood or plasma to diminish with age Vitamin K can be administered by mouth but, as absorption is usually defective, it is advisable to give it parenterally The preparation employed is 2-methyl-1· 4-naphthaquinone or menadione (vitamin K_4)—it is given intramuscularly in oily solution or a water-soluble derivative may be injected intravenously.

Obstructive jaundice and biliary fistula—Vitamin K should be given in these conditions to prevent the prothrombin level falling to a dangerous degree, its administration should anticipate the appearance of haemorrhages Thus, when operation on a patient with obstructive jaundice is proposed, a preliminary estimation of the prothrombin time is essential, if this indicates a low prothrombin content 2 milligrams of menadione in oily solution should be given daily by intramuscular injection until the prothrombin level exceeds 70 per cent of normal This dosage should be continued for a week after operation

If, through neglect of these precautions, active haemorrhage takes place, 10 milligrams of a water-soluble derivative of menadione should at once be given by the

rapidly When active haemorrhage has been brought under control 2 milligrams of menadione in oily solution should be injected intramuscularly each day until a normal level is reached

Steatorrhoea and other intestinal disorders—Significant hypoprothrombinaemia is rare in these diseases if a haemorrhagic state appears, or if the prothrombin oily solution

of a bleeding tendency, 2 milligrams of menadione in oil should be injected intramuscularly and 2 milligrams given by mouth Blood transfusion is only required when there is massive haemorrhage or shock or when it is desirable to bring the haemorrhagic

to give the infant 2 milligrams by intramuscular injection immediately after birth, or

quately investigated and cannot be satisfactorily explained

Frictions are especially indicated for indurations around joints resulting from disease or injury and for localized indurations elsewhere in the body

Pétrissage.—This name is used to describe a specialized form of kneading in which the part under treatment is picked up and subjected to rhythmical squeezing and stretching It is of
treatment of painful depos
pétrissage may free adhesi
fibres.

Used with lanolin and designated grease massage the manipulation is of great value after plastic operations

Percussion movements (tapotement)

effect it increases the activity of the cells in the lung tissues increases the circulation and by loosening the mucus facilitates expectoration

Shaking.—This man pulation is of value in certain chronic lung conditions and usually follows clapping with the object of loosening mucus

REMEDIAL EXERCISES

Movements are prescribed as a means to an end namely the restoration of full function to correct faults in function or to improve function in conditions in

PASSIVE MOVEMENTS

Passive movements are performed by the physiotherapist the patient being completely relaxed and taking no part in them Orthopaedic surgeons seldom prescribe

increase

Passive movements may be legitimately employed to assist venous return in congestive heart failure to maintain full movement and prevent contractions when a limb is paralysed and to prevent adhesions contractions and deformities in such conditions as rheumatoid arthritis It is also permissible to prescribe passive stretchings in the case of clawed toes

In any of these conditions a haemorrhagic state will supervene when the prothrombin content of the plasma judged by the ' prothrombin time , falls below 20 per cent of normal Loss of blood at operation may be sufficient to reduce the prothrombin content from above to below this critical level and this explains the frequency of haemorrhage after operations on jaundiced patients

The plasma prothrombin can be increased either by furnishing preformed pro-

bin activity of stored blood or plasma to diminish with age Vitamin K can be administered by mouth but as absorption is usually defective it is advisable to give it parenterally The preparation employed is 2 methyl 1 4-naphthaquinone or menadione (vitamin K_4)—it is given intramuscularly in oily solution or a water soluble derivative may be injected intravenously

Obstructive jaundice and biliary fistula—Vitamin K should be given in these conditions to prevent the prothrombin level falling to a dangerous degree its administration should anticipate the appearance of haemorrhages Thus when operation on a patient with obstructive jaundice is proposed a preliminary estimation of the prothrombin time is essential if this indicates a low prothrombin content 2 milligrams of menadione in oily solution should be given daily by intramuscular injection until the prothrombin level exceeds 70 per cent of normal This dosage should be continued for a week after operation

rapidly When active haemorrhage has been brought under control 2 milligrams of menadione in oily solution should be injected intramuscularly each day until a normal level is reached

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should be given daily until a normal level is reached

Haemorrhagic disease of the newborn—At the first suggestion of a bleeding tendency 2 milligrams of menadione in oil should be injected intramuscularly and 2 milligrams given by mouth Blood transfusion is only required when there is massive haemorrhage or shock or when it is desirable to bring the haemorrhagic state under immediate control It has been recommended that prophylactic injections of vitamin K should be given to the mother during the last few days of pregnancy 2 milligrams of menadione in oil for the last 7 days is said to ensure a normal prothrombin level in the infant An alternative method of prophylaxis is to give the infant 2 milligrams by intramuscular injection immediately after birth or 10 milligrams by inunction in an ointment on the first and second days of life

It is well to recall that hypoprothrombinaemia accounts for only a proportion of the haemorrhagic states in the newborn infant The remainder have not been adequately investigated and cannot be satisfactorily explained

Inadequate synthesis in liver disease

Parenchymatous disease of the liver —The fault here lies in the hepatic synthesis of prothrombin and only blood transfusion will raise the plasma's content of this substance Thus 500–1,000 millilitres of fresh blood should be administered immediately any evidence of haemorrhage is noted Coincident jaundice may contribute by causing vitamin K deficiency, and it is wise to give 10 milligrams of water soluble derivative of menadione by intravenous injection

Dicoumarol overdosage

When the prothrombin time becomes dangerously prolonged during administration of dicoumarol the drug must be withheld, 50 milligrams of the water-soluble derivative of menadione should be given by intravenous injection and, if active bleeding takes place, blood transfusion is advisable

Idiopathic hypoprothrombinaemia

This is a rare, probably congenital, anomaly, the cause of which is unknown Vitamin K does not affect the bleeding tendency and liberal transfusion of fresh blood is required

EXCESS OF ANTICOAGULANTS

Haemophilia

Haemophilia is a hereditary haemorrhagic state, limited to males and transmitted

factor may be the essential abnormality of the disease Normal blood or plasma

The bleeding tendency in haemophilia is shown by the formation of haematomas

Spontaneous haematomas beneath the mucosa of the pharynx or larynx, or into the tissues of the neck and mediastinum, may threaten life

time, only one is effective, transfusion of blood, plasma, or certain plasma derivatives A transfusion of 100–250 millilitres of plasma will reduce the coagulation time to normal, or near normal, for 6–12 hours

administered to haemophilics, in a manner analogous to the use of insulin in diabetes

mellitus, which will preserve a normal coagulation mechanism These observations are still in the experimental stage and there is some evidence that the antihaemophilic globulins may be antigenic and their effect thus neutralized

Maintenance treatment is thus impracticable at present, and the transfusion of

there is active haemorrhage and anaemia, whole blood should be given in amounts sufficient to make good the loss, if not, 100–250 millilitres of freshly separated plasma will lower the coagulation time to normal for 6–12 hours

The control of haemorrhage from wounds in the haemophilic patient is often difficult measures which favour rapid healing are often antagonistic to those which

blood transfusion extractions are usually uneventful

Haematuria is a common symptom, usually unrelated to trauma and occurring independently of any pathological changes in the urinary tract Rest in bed and blood transfusion are advised

the patient is better not confined to bed, haemarthrosis is seldom related to trauma and has been repeatedly noted in haemophilics at rest Ice bags help to relieve pain,

stituted early Chronic haemophilic arthritis demands all the ingenuity of the orthopaedic surgeon, unless great care is observed in correcting deformities further haemorrhage is precipitated

The advantages of surgery must be denied to haemophilic patients When the

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EXCESS OF ANTICOAGULANTS

Haemophilia

Haemophilia is a hereditary haemorrhagic state limited to males and transmitted by females The coagulation defect is manifest by a prolonged clotting time The cause of the defect is unknown It has been attributed by some to an undue stability of the platelets, recently an antithromboplastin has been demonstrated in haemophilic plasma There is evidence that haemophilic blood lacks a factor, linked with the plasma euglobulin, which is present in normal blood The absence of this factor may be the essential abnormality of the disease Normal blood or plasma transfusion reduces the coagulation time of the haemophilic The substance responsible is associated with the euglobulins of the plasma and can be concentrated by modern methods of plasma fractionation, it is called antihaemophilic globulin

The bleeding tendency in haemophilia is shown by the formation of haematomas after trivial injuries, by haemorrhage from wounds and after dental extractions, by haemarthrosis and by haematuria Haemorrhage into the skin is rare, large subcutaneous haematomas are common and extend until arrested by fascial planes Spontaneous haematomas beneath the mucosa of the pharynx or larynx, or into the tissues of the neck and mediastinum, may threaten life

Treatment —The treatment of haemophilia falls into two parts the correction of the coagulation defect and the arrest of local haemorrhage Many substances and many methods have been employed in the past in the hope of reducing the clotting time only one is effective, transfusion of blood, plasma, or certain plasma derivatives A transfusion of 100–250 millilitres of plasma will reduce the coagulation time to normal or near normal, for 6–12 hours

It has proved possible to concentrate the antihaemophilic euglobulin of normal plasma so that injection of 200–400 milligrams intravenously will maintain a normal coagulation time for 8–12 hours It may not be long before a substance can be administered to haemophilics, in a manner analogous to the use of insulin in diabetes

required at times it has a haemostatic effect and it is not a rare experience for remission—both clinical and haematological—to follow It has been argued that this is no more frequent than can be accounted for by chance

Before splenectomy is considered, it is important to review the diagnosis Possible toxic causes must be excluded, the most likely to escape detection is Sedormid (allyl*iso*propylacetyl-carbamide) Examination of the bone marrow is essential, not only to exclude leukaemia and similar states, but to demonstrate megakaryocytes of immature form and in numbers not less than normal The absence of megakaryocytes is a contra indication to splenectomy, for it shows that the bone marrow is incapable of forming platelets, even when the splenic influence is removed

Even when these criteria are fulfilled, splenectomy cannot be regarded as a certain cure. *complete relief is obtained in between 50 and 70 per cent of cases, in fully* 30 per cent symptoms return within 4 years The indications may be stated as follows

[illegible]

evidence to suggest that the heparin content of the blood is increased in such patients and that injection of toluidine blue or protamine sulphate will control the haemorrhagic state enough to diminish the hazards of operation

(2) Chronic or relapsing cases in which there is no sign of remission after a period of observation In such instances it is particularly to be considered in children when interfering with growth or development, and in women when menorrhagia is a serious problem

Thrombocytopenic purpura secondary to various forms of splenomegaly is mentioned in the section on proliferative diseases of the blood forming organs [illegible] influence on platelet formation to [illegible] marrow are [illegible] operation is only justified when the underlying disease is known to be indolent and when bleeding constitutes a severe disability

Gairdner, D (1948) *Quart J Med*, 17, 95

PROLIFERATIVE AND NEOPLASTIC DISEASES OF THE BLOOD-FORMING ORGANS

INTRODUCTION

The lympho reticular tissue, which is the anatomical basis of the haemopoietic system, has a unique liability to disorders marked by progressive cellular proliferation These diseases fall into two main groups in the first, the histological criteria of malignancy are lacking in the second, they are evident The two categories are [illegible]

myelomatosis

HAEMORRHAGIC STATES OF UNCERTAIN NATURE

Thrombocytopenic Purpura

The combination of purpura, bleeding from mucous surfaces, a low platelet count and a prolonged bleeding time accompanies a number of disease processes. The relation between thrombocytopenia and the haemorrhagic state is obscure, but a rough reciprocity between the two exists, in many instances there is evidence of a defect in the vascular control of haemostasis These disorders may be classified as follows

(1) Essential thrombocytopenic purpura (Werlhof)
(2) Thrombocytopenic purpura secondary to various forms of splenomegaly
(3) Myelophthisic thrombocytopenia leukaemia, aplastic anaemia, carcinomatosis of bone, osteosclerosis, myelosclerosis
(4) Toxic thrombocytopenia due to such drugs as neoarsphenamine, Sedormid, gold or benzol
(5) Allergic thrombocytopenia
(6) Thrombocytic acroangiothrombosis

Of these disorders, myelophthisic thrombocytopenia is obviously secondary, the recognition of toxic thrombocytopenia is usually simple, and the withdrawal of the toxic agent is all that is required Allergic thrombocytopenia is an ill defined group and is probably uncommon Thrombocytic acroangiothrombosis is a very rare disorder running an acute course which always terminates in death The treatment of essential or idiopathic thrombocytopenic purpura alone demands detailed description

Idiopathic thrombocytopenic purpura

This is a disease predominantly of children and young adults, it is characterized by spontaneous bleeding into the skin, from mucous membranes, and less frequently into the central nervous system and meningeal spaces Examination of the blood shows a reduced platelet count, a prolonged bleeding time, and diminished or absent clot retraction There is a rough, but inconstant, correlation between the

and the probable explanation is a depression of their formation Splenectomy is usually followed by a brisk increase in the numbers of circulating platelets and dis-

70 and 80 per cent It should be noted that blood transfusion will rarely, if ever, render a patient, previously unsuitable, fit for radiotherapy

One other cause of anaemia in these diseases requires comment when there is outstanding splenomegaly, whatever the pathological process responsible, a symptomatic haemolytic anaemia may occur This will usually yield to splenectomy The instances of reticulosis and reticulosarcoma in which this operation is justifiable are few, but if the disease is known to be indolent and all symptoms can safely be attributed to the haemolytic anaemia, it deserves consideration

In reticulosis and reticulosarcoma, resistance to infection is diminished This is due to inadequacy of the immunity mechanisms, to which is often added a profound neutropenia The latter is a feature of acute leukaemia, in which it combines with infiltrations of the gums and of the pharyngeal lymphoid tissue to predispose to necrotic angina and gingivitis In the chronic leukaemias, pneumonia was formerly one of the major causes of death, similarly tuberculosis, once a common complication of chronic leukaemia and of Hodgkin s disease, is now a rarity

Penicillin will now control in great measure this liability to infection pastilles are of value in stomatitis and gingivitis, although their prolonged use often leads to glossitis At the first hint of faucial, respiratory or cutaneous infection, parenteral penicillin is advisable when the leucocyte count falls below 2,000 per cubic millimetre or on the sudden appearance of unexplained fever

General preventive measures to guard against infection are recommended Undue exposure and unnecessary contact should be avoided Any minor infective disease should be treated with exaggerated respect, a cold in the head is an indication for 2 or 3 days in bed

A tendency to haemorrhage is the rule in acute leukaemia, and is common in the later stages of chronic leukaemia, it occurs in some patients with myelomatosis, but is rare in Hodgkin's disease and similar reticuloses It is associated in most instances with a reduction in the platelet count and, although generally held to be attributable to this, there is no exact parallelism between the two With the improved means of treating infection and anaemia, the haemorrhagic state has become of major importance as an immediate cause of death in acute leukaemia It has been found recently that there may be an increase in heparin like substances in the blood of patients with this disease, and there is some evidence that injections of protamine sulphate or of toluidine blue may help to control the bleeding tendency by neutralizing them These observations are still in the experimental stage, the only measure readily available at present is blood transfusion, and it is of doubtful value

[illegible]

justifiable

Two additional symptoms, common to many of these diseases, require con-

With certain exceptions, the diseases of both groups are commonly manifest by the enlargement of lymph nodes and by splenomegaly; infiltrations in the bone marrow, in the lymphoid tissue of the upper respiratory tract and in the alimentary tract are frequent, and in some instances cutaneous eruptions occur. Many of the diseases present an initial phase in which symptoms are due to local tumours or infiltrations and in which general health is preserved, and a disseminated phase which is accompanied by cachexia, fever and haemopoietic failure All these diseases terminate fatally, and only occasional instances of recovery or cure have been reported.

GENERAL PRINCIPLES OF TREATMENT

[illegible]

diseases.

In diseases of protracted course and fatal outcome, general management and symptomatic treatment are essential throughout the illness The general practitioner or physician should remain in charge of the case His role is to take a personal interest in his patient's welfare, to treat every symptom throughout what may be a long and tedious illness, and to maintain morale during the course of a disease which is [illegible]

this end it is wise to encourage the patient to live, for as long as he can, a full and normal life, irradiation should be undertaken as an out-patient when possible and the patient's routine of living should be interrupted as little as possible

No general measure to maintain health should be neglected The diet should be [illegible]

pain relieved, and the action of the bowels regulated

In the more acute, and in the later stages of the chronic, forms of these disorders, symptoms arise largely through haemopoietic failure The consequences are anaemia, liability to infection, and a tendency to haemorrhage

Anaemia is commonly due to infiltration of the bone marrow, although this is not true of Hodgkin's disease in which it resembles the anaemia of infection Haematinics in all instances are valueless, and blood transfusion alone will raise the [illegible]

transfusions which have no effect on his complaint In chronic cases it is usually justifiable, and an effort should be made to maintain a haemoglobin level between

it is acknowledged to have a close relation to chronic myeloid leukaemia The disease is marked by a great increase in total blood volume, due largely to an increased production of red blood cells, examination of the blood shows a raised red-cell count and haemoglobin reading, with a packed cell volume greatly in excess of normal

Symptoms are due to the increased blood volume and to the extreme viscosity of the blood Vascular degeneration is common and, combined with the viscid blood, is responsible for the frequency of arterial and venous thrombosis In a considerable proportion of patients, erythraemia is associated with peptic ulcer Haemorrhage into the alimentary tract is common, not only when peptic ulcer is present but also from varicosities due to vascular engorgement

The aim of treatment is to reduce the blood volume and the blood viscosity There are three main methods by which this may be achieved First, blood may be removed by venesection This measure has the advantages of simplicity and safety; it is *particularly useful when symptoms have rapidly become severe and urgently require* control Blood in quantities of 400–500 millilitres may be removed repeatedly at

such evidence of iron deficiency as sore tongue, angular stomatitis and koilonychia may appear

The second method is by destruction of blood This is usually effected by medication with phenylhydrazine or acetylphenylhydrazine They can be used either as a

...ns of maintaining a

...not without danger,

...withdrawal As a

drop after 0 3–0 4 gramme has been given, when dosage will need to be reduced A slower decline can be produced by 0 2 gramme at intervals of 3–7 days The greatest value of phenylhydrazine is probably in its power to maintain a normal blood count after reduction by venesection or some other method For this pur pose, 0 1 gramme, once or twice a week, is usually sufficient, and may be continued almost indefinitely

The final means of reducing the viscosity and volume of the blood is by depressing haemopoiesis Since excessive formation of red blood cells is undoubtedly the immediate cause of erythraemia, this line of treatment is logical Arsenic has been

usually falls first, and treatment should cease when it reaches ...

millimetre, occasionally a decrease in the platelet count is earlier The red blood cells and the haemoglobin level start to fall some weeks later, and in this lag lies one

ACUTE LEUKAEMIA

Although three cytological types of acute leukaemia are recognized there is no essential difference in their management The course of each is commonly short,

for it.

glutamic acid), a remission has been secured in 30–50 per cent of the patients. Aminopterin may be given by mouth or by intramuscular injection in doses of 1–4 milligrams daily Dosage is controlled by the changes in the leucocyte count and by the development of toxic symptoms The latter, particularly stomatitis

CHRONIC MYELOID LEUKAEMIA

Chronic myeloid leukaemia is a condition in which spontaneous and therapeutic remissions occur readily in the earlier phases The first remission may last for 18 months or even longer, the remissions become progressively shorter and the disease finally becomes resistant to treatment

Radiotherapy has been used more widely than any other measure to control the proliferative process Many different technical methods have been employed but perhaps x-irradiation of the spleen is that most generally adopted. Details must be

a considerable further decrease will occur. The haemoglobin level begins to rise

The nitrogen mustards have been shown to have a selective action on lymphadenomatous tissue and to procure remission in many cases of Hodgkin's disease The two drugs in common use are methyl-*bis* (β-chloroethyl) amine hydrochloride and a closely related *tris* compound The first has been most widely employed The usual course is 0 1 milligram per kilogram of body weight, daily for 4 successive days Various methods of giving this total dosage have been introduced, it is often more satisfactory to limit the single dose to 5 milligrams, which may be administered daily or on alternate days, until the total dosage has been reached Most of those using the drug have found it wise to set up a saline drip and to inject the dose of nitrogen mustard, immediately it has been dissolved in 10 millilitres of sterile saline solution, through the rubber tube of the drip apparatus This precaution avoids any possibility of leakage into the tissues, and minimizes the risks of thrombosis Nausea and vomiting, 3–6 hours after the injection, are common These drugs depress the bone marrow, and leucopenia and thrombocytopenia follow their administration These changes progress for from 2 to 3 weeks, after which there is a rapid return to normal levels.

The remissions following nitrogen mustard are usually short-lived, and the drug has in no way supplanted radiotherapy Nitrogen mustard is useful when the disease is widespread and irradiation is impossible, it is said sometimes to render radiosensitive those patients whose disease had become resistant, it is often followed by abatement of fever, and it often relieves the pain of bone infiltrations Its chief use is in the patient with generalized disease whom the radiotherapist is unwilling to treat

The place of surgery in Hodgkin's disease has been debated There is, however, evidence that, when disease is limited to one group of superficial lymph nodes, radical excision may be followed by "cure" Suitable cases are rare but the patient is probably offered his best chance by excision when, for example, the upper deep cervical group on one side is alone affected Excision should be followed by irradiation

Arsenic, urethane, and radiophosphorus have little effect in reducing the size of nodal masses

OTHER FORMS OF RETICULOSIS

Lymphoid follicular reticulosis

local nodal masses

Lympho reticular medullary reticulosis

Lympho reticular medullary reticulosis (Hodgkin's paragranuloma of Parker and Jackson) resembles Hodgkin's disease, but it is of much slower evolution A remission of many years may intervene between treatment of the primary mass of lymph nodes and any further extension of the disease It would seem to present

... be necessary to undertake venesection
... certainty of dosage. the erythro-
... and an
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injection of 3-5 millicuries.
... is not available, the most satisfactory method ...
... with small

to bleed is common Peptic ulcer ...
operations should be undertaken only if necessary to save life

HODGKIN'S DISEASE

Hodgkin's disease is another disease in which the variation in the clinical picture ... of progress demands individual treatment of each patient. In 75 per ... enlarged lymph nodes in one or more groups ... is radiographic evidence of concurrent affec- ... in 10 per cent the axillary nodes are first ... A localized phase without deterioration ... e with febrile cachexia can usually be recognized The duration of the disease is of great variability, but not more than 50 per cent survive 3 years and after 5 years 90 per cent are dead

Nodal swellings can usually be caused to shrink by irradiation, and this is particularly true in the earlier stages of the disease, when the patient may be restored to ... months As other groups are involved, larger fields re- ... treatment ... gest a larger dose, in the hope of preventing ... prescribe a maximal dose, with the hope of "cure" To the writer, the first seems the best method, but the details are discussed in another section When wide fields require irradiation, the x-ray "bath" to the whole abdomen, thorax, or even the entire trunk may be worth a trial It needs careful haematological control but satisfactory results have been obtained

animal protein was necessary for full benefit to be obtained Experience has shown [illegible]

More recently, promising reports of the effect of urethane (ethyl carbamate) in myelomatosis have been published It is prescribed in the same manner as in chronic myeloid leukaemia After about 3 weeks leucopenia develops, and at this time the dose of urethane should be reduced to not more than 2 grammes daily, at which level it may be continued for 6–8 weeks The improvements claimed include gain in weight, relief of pain, arrest of progress of skeletal lesions and repair of anaemia

It is as yet uncertain what part these two drugs should play in the treatment of myelomatosis, but it is reasonable to try the effect of the relatively innocuous urethane before recommending injections of Stilbamidine or Pentamidine

R BODLEY SCOTT

particularly suitable conditions for surgical excision of the diseased nodes The disease is radio-sensitive

RETICULOSARCOMA

Treatment depends largely on the location of the tumour the majority are systematized neoplasms, appearing synchronously in the lymph nodes of all groups, in the liver and in the spleen, but local tumours may occur in superficial or deep groups of lymph nodes or in the lymphoid tissue of the upper respiratory or alimentary tract The local tumours show a tendency to become systematized with the passage of time, but blood borne metastases and spread to regional lymph nodes are also observed

Radiotherapy is the only method of control which is at all effective, and it leaves much to be desired Although local masses may be caused to shrink, spread or recurrence of the disease is not long delayed Nearly one fifth of these tumours are radioresistant in the initial stages and those that are sensitive lose this property rapidly In view of their widespread nature, the "bath" technique is often required Localized tumours, limited to one group of superficial lymph nodes, are probably best treated by radical excision followed by irradiation

Growths in the nasopharynx or in the alimentary tract may require surgical treatment The latter lead early to obstruction of the small bowel

Experience has shown that radiophosphorus and nitrogen mustard, while occasionally leading to improvement, are less effective than is irradiation in the treatment of reticulosarcomas

MYELOMATOSIS

Myelomatosis is to be regarded as a reticulosarcoma in which the cytological type is the plasma cell The neoplastic process is typically limited to the bone

throughout the skeleton More commonly, the picture is of a diffuse skeletal disease with multiple tumours and spontaneous fractures, or with osteoporosis, particularly of the vertebral column Occasionally the symptoms of anaemia or of renal failure are the earliest complaints

The diffuse nature of the neoplastic process makes irradiation unsafe Recently two drugs have been employed in the treatment of myelomatosis Stilbamidine (4 4'- diamidinostilbene) was introduced by Snapper it is given intravenously or, with a small quantity of procaine added, intramuscularly Injections are given daily or on alternate days, the first dose is 0 05 gramme, the second 0 10 gramme and thereafter 0 15 gramme Immediate vasomotor symptoms are common, and can be diminished by prescribing $\frac{1}{100}$ grain of atropine sulphate

elderly patients, who improve at first with liver extract but whose red-cell count will not rise above 3,500,000 per cubic millimetre, transfusion may improve the response to liver therapy In the megalocytic anaemia of sprue and in that due to nutritional deficiency, response to liver extract or to folic acid may be slow, and an initial transfusion is sometimes advisable in severe cases Blood transfusion (especially with concentrated red-cell suspension—*see* page 109) is the main treatment for aplastic and related refractory anaemias It should be given in every case as soon as it appears necessary and should be continued, however bad the outlook seems, *in the hope that the bone marrow may ultimately be able to form red* cells once more In an average case the haemoglobin level drops by approximately 1 per cent per day The role of transfusion in familial haemolytic (acholuric) jaundice, a disorder dependent on an inherited anomaly of the erythrocyte, is to fit the patient for splenectomy, blood transfusion may be a life saving procedure in a haemolytic crisis which is an occasional complication of this disease

In acquired haemolytic anaemia there is evidence that haemolysins of immune body type are often the aetiological factor and transfusion, as well as combating

since although in some cases transfusion appears to act as a specific remedy in arresting haemolysis, in others it may aggravate it Haemolytic disease of the newborn, due to Rh incompatibility between mother and foetus, usually responds well to early transfusion of appropriate Rh negative blood The technique of exchange transfusion (*see* page 118) is recommended in severe types and by its means it is possible to provide the infant with such a concentration of Rh negative cells by a single operation that no further transfusions will be required Anaemia is a prominent feature of the leukaemias, Hodgkin's disease, and related reticuloses and, when marked, transfusion may temporarily improve the patient s general condition Since such anaemia is mainly due to erythropoietic tissue being crowded out of the bone marrow by new formations, its appearance in severe degree is of bad omen and usually indicates a terminal phase, further, it is rare for transfusion in such cases to permit resumption of radiotherapy when it has had to be suspended Blood transfusion in acute leukaemia may rarely cause a remission and by supplying platelets may render the haemorrhagic manifestations less severe, but the incidence of reactions is high The consensus of opinion is that the use of exchange or

the

ans-

fusion In the former, transfusion of whole fresh blood (or of plasma) provides the *most effective measure for the reduction of the coagulation time* Even 100 millilitres of blood will bring about a sharp decrease by providing the "anti haemophilia globulin", and this can be repeated as often as is necessary Dangerous haemorrhage can almost always be controlled, at least temporarily, in essential thrombocytopenic purpura by a transfusion The blood of a normal donor contains 250,000–500,000 platelets per cubic millimetre, a transfusion of approximately 400 millilitres of blood will therefore contribute to the patient some 40,000 platelets per cubic millimetre and this is usually sufficient to arrest

BLOOD TRANSFUSION

INDICATIONS FOR BLOOD TRANSFUSION

General Principles

ous fluid which is well retained in the circulation—such as plasma or serum—is suitable.

Frequently these two fundamental indications overlap In addition, transfusion may occasionally be performed in order to furnish a patient with (a) platelets or other clotting elements, as in essential thrombocytopenia and other haemorrhagic diatheses, (b) immune bodies, either complement or specific antibodies, as in infections, and (c) leucocytes, as in agranulocytosis

Blood Disorders

Haemorrhage

When loss of blood has occurred the aim should be replacement by blood if possible. In the anaemia of acute or chronic haemorrhage, transfusion of blood

has taken place

Pre-operative and post-operative anaemia

transfusion.

Anaemia associated with infection

In a severe infection, blood transfusion is indicated if the haemoglobin drops to 70 per cent (Haldane) Blood transfusion increases the patient's resistance to the

affections are often benefited by blood transfusion

Blood diseases

Transfusion in Addisonian and related megaloblastic anaemias is now seldom required since adequate treatment with liver extract is usually successful In some

cent of such cases the child is Rh positive and the mother is Rh *negative with Rh* antibody in her circulation.

(4) For infants affected with haemolytic disease These children are usually Rh positive and immediately after birth may possess in their circulation much Rh antibody derived from the mother On account of the latter, transfusion with Rh-
[illegible]

after removal of the plasma, would be satisfactory.

For an Rh-positive patient (85 per cent of British people come within this grouping) the Rh factor need not be taken into account in transfusion therapy since sensitization of such an individual even if given Rh-negative blood is extremely improbable.

Human Plasma and Serum

The use of these blood products is now almost entirely confined to the dried state since the liquids proved unstable with storage, clot formation occurring in liquid plasma and precipitation of calcium soaps in liquid serum, both Seitz-filtered Serum is derived from blood which has been allowed to clot and it therefore contains no fibrinogen Its protein content is approximately 7 per cent Plasma is obtained from citrated blood and, although possessing fibrinogen, has a lower protein content (4–5 per cent) than serum, owing to the added diluent In preparation the serum or plasma from bloods of various groups is pooled, this results in a product low in agglutinin content which can be safely used for a patient of any group

Reconstitution of Dried Serum or Plasma

[illegible] of normal [illegible]

[illegible] normal concentration—that is, containing 14 per [illegible] The con- [illegible] saline or 5 per cent glucose may also be used for solution Because of the risk of bacterial contamination during reconstitution and subsequent growth this should only be carried out immediately before administration. The serum or plasma once dissolved should *not be stored for future use Dried serum and plasma are* extremely stable and will keep indefinitely in a cool atmosphere in the dark, refrigeration is not required

Reconstituted serum and plasma are liquids with a high content of physiological protein and they possess valuable powers of restoring and maintaining blood volume For this purpose both are far better than normal saline solution Allowing for the difference in protein content between each, and giving requisite volumes,

haemorrhage When splenectomy is decided on, transfusion is *often* necessary as a pre-operative safeguard

Shock

This is a rather poorly differentiated condition characterized typically by pallor, circulatory collapse and lowered body temperature, and it is dependent *on a fall in* blood volume The object of treatment is to restore the blood volume and to raise the blood pressure to an adequate level When the diminished blood volume is due wholly or mainly to loss of blood, blood transfusion is indicated, a sufficient volume being administered to raise the systolic blood pressure and to maintain it at a level above 100 millimetres of mercury No patient suffering from shock should be allowed to go to the operating theatre with a blood pressure that is much below this figure

VARIETIES OF BLOOD AND BLOOD PRODUCTS USED FOR TRANSFUSION

Relative Merits of Fresh and Stored Blood

great convenience Blood stored for more than a few days, however, rapidly deteriorates as regards functional leucocyte content, platelets and other clotting factors, and also immune bodies, specific and non specific Fresh blood (that is, blood less than 24 hours old) is, therefore, always preferable to stored blood and should be particularly employed in cases such as (1) patients with a blood disease—where maximal durability of the transfused red cells is desired, (2) patients with anaemia associated with sepsis—where immune bodies may be valuable, and (3) patients with a haemorrhagic disease or with continuing haemorrhage—where clotting factors are required

Indications for Rh negative Blood

used in the following cases

(1) For Rh negative patients of either sex who are likely to require multiple transfusions or who have had a previous transfusion even if the latter was some years previously Repeated transfusion of an Rh negative recipient with Rh positive blood is liable to induce sensitization with the production of Rh antibody and risk of incompatible reaction Previous indiscriminate transfusion may have

anticipated haemoglobin increase per M R C bottle of concentrated red-cell suspension when given to an adult (in the absence of simultaneous blood loss or blood dilution) is 15 per cent (Haldane) compared with 8 per cent with whole blood, and the reaction incidence is probably lower than with whole blood, serum or plasma Concentrated red-cell suspension possesses but poor volume restoring power

TECHNIQUE OF BLOOD TRANSFUSION

Selection of Donor

Any adult normal individual is suitable as a donor, the usual age limits are from 18 to 65 years It is preferable that a donor should not have had a heavy meal within 2 hours of being bled, but fasting and fatigue predispose to fainting The haemoglobin level should be 90 per cent (Haldane) or above Good superficial elbow veins are of practical advantage Syphilis, malaria and homologous serum jaundice comprise the significant transmissible diseases that must, as far as possible, be excluded in whole blood transfusion though the last mentioned of these is more related to plasma and serum transfusions In the case of malaria it is safe in practice to use a donor with a past history of malaria provided he has had (in the absence [illegible]

[illegible]

procedures

The donor should be of the same ABO blood group as the patient, the use of Group O as ' universal donor ' blood for recipients other than Group O, although [illegible]

[illegible]

been outlined It is unnecessary to pay attention to the M N or P factors in the routine selection of a donor since naturally occurring agglutinins for them are extremely rare, and when they do occur are usually of low titre and active mainly [illegible]

[illegible]

it is proposed to use should always be carried out in every transfusion when a short delay will not jeopardize life

Direct Matching Test

This constitutes a safeguard to the accuracy of the routine grouping and it may detect a subgroup reaction peculiar to the serum and cells in question Should grouping serum not be available direct matching may alone form the basis of compatibility

In relation to ABO groups

As a pre-operative measure which may be carried out by the bedside or in the operating theatre a tile technique using diluted blood is recommended A drop

if haemoconcentration is present

Examples of such cases of shock are (1) shock associated with extensive surgical procedures or with multiple injuries in which but little haemorrhage has occurred, (2) shock associated with crush injuries, and (3) shock associated with burns or scalds

In all these conditions there is a lowered blood pressure, accompanied in the case of the two last mentioned by haemoconcentration The aim in plasma or serum transfusion in these states is, as with blood given to combat shock dependent on haemorrhage, to raise the blood pressure and to maintain it at a level above 100 millimetres of mercury, a sufficient amount being administered to achieve this If large volumes are necessary, care must be taken that the red cells in the patient's circulation are not unduly diluted (haemoglobin below 70 per cent) by interspersing a bottle of whole blood The ratio of two bottles of plasma or serum to one of blood, controlled by repeated blood pressure and haemoglobin estimations is good practice Concentrated plasma or serum (concentrated two or three times normal) is claimed by some workers to give better results than the ordinary product in burn or scald shock since these patients are particularly liable to develop hypoproteinaemia, and also the increased protein content of the transfused fluid tends

nephritis by the transfusion of such solutions has proved to be of temporary benefit only

When blood transfusion is indicated, but is not immediately available, and in cases in which the possibility of Rh incompatibility precludes the use of ordinary ABO blood until this is excluded by a grouping test, plasma or serum should be given as an initial measure in urgent circumstances

CONCENTRATED RED-CELL SUSPENSION ("PACKED CELLS")

suitable centrifuge is available The supernatant plasma in each is siphoned off and the red-cell deposit in one bottle is added to that in the other, the mixture being topped up if necessary with a little 3 per cent citrate solution or normal

suspension be used only within 24 hours Concentrated red-cell suspension is

ture, and (4) anaemia occurring with nephritis, accompanied by oedema The

Anticoagulant

The anticoagulant employed for the standard volume of blood collected (420 millilitres) is 120 millilitres of a 2 per cent solution of disodium hydrogen citrate and 2 5 per cent glucose in freshly distilled water This is satisfactory for fresh or stored blood and permits the latter to be safely used, up to a period of 3 weeks from the date of collection Glucose is essential for the preservation of red cells in stored blood and the disodium salt is an improvement on the trisodium salt previously used For fresh blood transfusion the anticoagulant may consist merely of 120 millilitres of a 2 per cent solution of tribasic sodium citrate In order to prevent, and to provide a safety margin against, coagulation, a minimum of 0 3 gramme of sodium citrate is necessary per 100 millilitres of blood

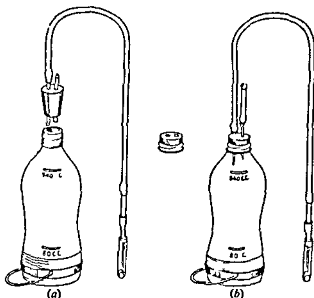


FIG 1 —Standard M R C blood bottle and collecting set (a) Type A and (b) Type B

ed o t by

Apparatus for collection

The standard collecting set is put up and sterilized by autoclaving in individual packets of unbleached calico or wrapped in Cellophane paper in tins Two pat

f blood collect on are in common use depending on whether

ing (Type

Type A Replacement of the cap by a rubber bung and glass tubing (Fig 1(a)) —The screw cap is removed and placed between the folds of a sterile towel The bottle is then fitted with a sterile taking set" comprising a rubber bung pierced by two

of ½ or 3 drops of blood either from a living donor or (with sterile precautions) from a bottle of citrated blood to 1–2 millilitres of saline solution The serum and blood suspension are mixed with a glass rod or wire loop The tile is then gently rocked and allowed to stand for 10–15 minutes after which time it is again agitated and the red cell and serum mixture examined by naked eye and with the aid of a hand lens for agglutination The most common cause of an apparent incompatibility between a serum and red cell suspension which should be compatible according to individual routine grouping tests is rouleaux formation, or pseudo-agglutination It is recognized by the fact that if the serum is diluted 1 2 or 1 3 with normal saline solution before the addition of the red cell suspension the phenomenon tends to disappear The granularity of rouleaux formation is also of a fine homogeneous pattern compared with the coarser heterogeneous picture of true agglutination The technique as described above is not applicable to the detection of Rh incompatibility

In relation to Rh group

When this is indicated, a tube technique is best employed One drop (0 05 millilitre) of the patient's serum is mixed in a precipitin tube (50 × 6 millimetres) with a

be oxalated, citrated or heparinized, or a heavy suspension of cells—about 50 per cent—in their own serum may be used The slide is warmed by holding it over an electric light bulb, and gently rocked In the majority of instances it is sufficient to observe the slide over a period of 3 minutes and if any incompatibility is present, agglutination should be obvious at the end of this time Drying of the mixture leads to rouleaux formation and in cases of doubt one or two drops of saline solution should be added this tends to disperse rouleaux but does not influence agglutination

Both the tube and rapid slide techniques will detect incompatibility dependent on the agglutinating or incomplete Rh antibody Incompatibility due to the anti A or anti B agglutinins is also revealed

COLLECTION OF BLOOD

The Medical Research Council blood transfusion outfit is now the standard apparatus in Great Britain The bottle (Fig 1) slightly waisted to facilitate holding, is fitted with an aluminium screw cap with a 4-millimetre rubber wad and is pro-

bulb and 1 yard (90 centimetres) of rubber tubing terminating in a sharp stainless steel narrow bore needle (*see* Appendix page 127) The last 2 inches (5 centimetres) of tubing attached to the needle is detachable by means of an adapter fitting A short distance above this is a screw clip by which the flow of blood through the set as denoted by the rate of flow in the drip bulb can be controlled A metal cannula (Fig 3) can be attached directly to the male adapter after removal of the needle and its tubing when it is necessary to cut down on the vein

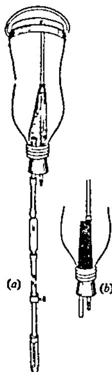


FIG 2 —Standard M R.C. blood bottle and administration set. (a) with gas-mantle filter (b) with metal gauze filter

finely knitted cotton as used in the manufacture of gas mantles It is 3½ inches (9 centimetres) long and threaded with a purse string at each end One of these is tied round the long glass air inlet tube beyond a ¼-inch (0 5 centimetre) ring of thick pressure tubing pushed on to the glass tube until it is about 2½ inches (6 5 centimetres) from the narrow end of the bung The other is fastened round a groove in the neck of the bung In this way the stocking is pulled into a stretched closed cone over the inner end of the delivery tube (Fig 2 (a))

Metal gau e filter —This consists of a cyl nder of close meshed stainless steel gauze approximately 2½ inches (6 5 centimetres) in length and ¾ inch (1 5 centimetres) in diameter One end is open and the other partially closed by a fold of the gauze The filter is slipped on to the long glass air inlet tube, open end towards the bung and slid up the tube until it makes contact with the narrow end of the bung—thereby enclosing the inner portion of the outlet tube A small ¼-inch (0 5 centimetre) ring of thick pressure tubing is then rolled up the long air inlet tube until it touches the other end of the filter and prevents its displacement This end which is already partially occluded should finally be firmly closed by apply ing pressure with artery forceps (Fig 2 (b))

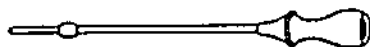


FIG 3 —Standard metal cannula

Use of standard giving set

The standard giving set is packed in an unbleached calico bag or in Cellophane paper in a tin and sterilized by autoclaving

example a violet permanganate colour) it should not be used

metres in external diameter), one of
in air outlet. To the other
attached about 14 inches

serve as a window so that the opera...
rapid confirmation that the vein has been entered.

The donor lies flat on a bed or couch, the head being supported by a pillow.
in the antecubital fossa, the elbow resting on a firm
or tourniquet is applied to the upper arm
the selected vein is cleaned with suitable

couraged by giving
e hand on the same
bottle has filled to

aluminium cap re-applied with sterility prec... bottle is inverted to
ensure adequate mixing of the anticoagulant solution with the blood.

of the cap by two needles (Fig 1 (b)) —In this method the alu-
3 millimetres in diameter, which
ived by either a viscose cap or a
he perforations exposed immedi-
d of the rubber bung and glass
one of which is attached to the
small glass

laboratory tests from the end of the rubber tubing

ADMINISTRATION OF BLOOD

The standard blood-giving apparatus (Fig 2) consists of a rubber bung pierced
centimetres) long, reaches almost to
its outer orifice is fitted with a
imetres) long, has attached in
) of rubber tubing, a drip feed

syringe attached and about 0·1–0·3 millilitre of marrow withdrawn by suction—thus showing that the marrow cavity has been entered Such negative pressure when the needle is in the cavity often causes the patient a slight twinge of pain The sensation of entering the marrow cavity is so characteristic that failure *to withdraw marrow by suction should not delay the transfusion* By means of the syringe the lumen of the needle is filled with saline or citrate solution, and the administering unit, prepared as for an ordinary intravenous transfusion, connected with it by means of the male adapter The guard is adjusted to rest flat on the chest wall and its wings held in position with strips of Elastoplast The needle is also [illegible]

by shifting the position of the needle without withdrawing it, or by disconnecting the administering unit and first aspirating a little marrow or else injecting some sterile citrate solution by means of a syringe.

Tibia

For administration to the tibia a straight splint is applied to the outer aspect of the leg The site of puncture is the antero medial surface of the tibia at the level of [illegible] The skin is [illegible] the peri- [illegible] externally [illegible] The Salah [illegible] half way between the anterior and medial borders of the bone, and pointing [illegible] distally so as to miss the epiphyseal line The soft bone of an infant is punctured easily and no marked "give" is apparent when the marrow cavity is entered Entry is usually effected about ¼ inch below the periosteum and can be best demonstrated by the *aspiration of marrow The procedure is then the same as for sternal puncture* The wings of the guard may be moulded round the limb to hold the needle in position The transfusion tends to be slow at first and to increase in rate spontaneously after 5–10 minutes

Exchange Transfusion

In newborn infants

The technique of exchange transfusion is recommended for the treatment of [illegible]

of sensitization (positive direct Coombs test) is an indication for this type of transfusion

Technique—Exchange is effected through the umbilical vein which can be used for this purpose any time up to about 24 hours after birth Thereafter it rapidly becomes occluded

The bottle is inverted 2 or 3 times before administration of the blood in order to secure even mixture of the red cells It is then with advantage placed for 20–30 minutes in a bowl of water at 37° C. to warm the blood (over-heating must be carefully avoided as it causes haemolysis). The aluminium cap is then unscrewed and

of rubber tubing from the rest of the giving unit at the adapter fitting, and place them in the folds of a sterile towel Remove the cork from the outer end of the air-inlet tube (this may be followed by the escape of a few drops of blood from this tube) and unscrew the screw clip holding the male adapter just below the level of

the blood is flowing through it.

A vein in the antecubital fossa or in the forearm is usually chosen for the transfusion, the elbow being fixed with a back splint if the patient is restless The overlying skin is cleaned with suitable antiseptic and the vein is made full and prominent

adapter. As soon as this occurs the pressure round the upper arm is released and

arm

tubing, when the flow through the drip feed will re-commence.

case of plasma or serum, and the time taken Only by such records can the investigation of any reaction be completed, and the recognition of an icterogenic batch of

blood are withdrawn from the baby and discarded, and then 20 millilitres of blood are drawn from the bottle and injected The donor blood should be warmed to approximately 37° C before starting After every few syringefuls it is advisable to

replacement of the infant's blood using donor blood with the reduced volume of

In adults

Following the claim by French workers that exchange transfusion in patients with acute leukaemia would produce an immediate remission of variable duration up to 12 months, the procedure has been carried out on a few similar cases in Great Britain The results have not been very promising, nor better than those sometimes obtained by frequent smaller transfusions and, as indicated elsewhere, the consensus of opinion is now against replacement transfusion therapy in acute leukaemia

Technique —The aim is to effect a 95 per cent replacement of the patient's blood by blood of homologous group not more than 3 days old The rates of transfusion

transfusion If the antecubital veins are good the patient may be bled from one arm and transfused into the other, employing the standard apparatus and technique Immobilization of each arm by a splint is advisable When the veins are small it may be necessary to expose an antecubital vein or the internal saphenous vein at the ankle, and to effect bleeding through a tied in cannula Transfusion of the donor blood with veins of small calibre may be facilitated by the use of a plastic Poly-ethylene catheter (1 millimetre bore × 0 25 millimetre wall) pushed well up the vein following exposure of the vein and opening it just sufficient to admit the catheter immediately proximal to a ligature The rate of transfusion is controlled by the rate of bleeding In order to ensure smooth continuous bleeding—often a

usually about 5 hours

Survival of transfused red cells

It has been established by differential agglutination tests that fresh normal erythrocytes transfused into a patient of the same blood group, and in whom no haemolytic process is active, survive in the recipient s circulation for 100-120 days

The apparatus required consists of a 20-millilitre syringe, two 3 way stopcocks, a 19 gauge needle and a special plastic (Poly-ethylene) catheter, 1 millimetre bore × 0 25 millimetre wall A full bottle of blood, not more than a few days old, should be obtained and this should preferably have a higher proportion of blood to citrate than is generally employed, for example 500 millilitres of blood to 50 millilitres of anticoagulant, instead of the usual ratio of 420 to 120 millilitres The formula for the anticoagulant solution is.

Disodium citrate	37 5 gr	2 5 g
Glucose	45 gr	3 0 g
Distilled water	800 min	50 ml

The bottle of blood is fitted with a standard administration set and suspended beside the infant's cot The apparatus is then assembled as follows The two 3-way stopcocks are fitted into one another and then fitted on to the syringe The hub of the 19 gauge needle, the point of which fits into the plastic catheter, is then [illegible]

fitted respectively to the rubber tubing of the giving set and to a piece of rubber [illegible]

but is prepared by simply cleansing the stump of its umbilical cord and surrounding it with a sterile circumcision towel The cord is then cut across about half an inch from the abdominal wall, and proximal to any ligature that has been tied round it In case the umbilical vein should bleed violently a pair of artery forceps should be available to clamp the vessel temporarily Usually, however, the vein does not bleed and it can be identified as a large patulous vessel which contrasts with the two smaller, tightly contracted arteries The wall of the vein is now seized with a pair of "mosquito" artery forceps and the plastic catheter (sterilized by immersion in 1 per cent Cetavlon and rinsed in sterile saline solution before use) is introduced into the vein and pushed gently upwards The catheter often sticks at the level of the [illegible]

the catheter has been introduced for about 3 inches, some resistance is frequently met with as the tip of the catheter comes against the wall of the portal arch by a little manipulation at this stage, the catheter will often pass onwards through the ductus venosus and, at approximately 4 inches enters the inferior vena cava It is, however, unnecessary to pass the catheter for this distance in order to be able to carry out an exchange transfusion Even at a distance of about 2 inches it is often possible to withdraw blood satisfactorily and, provided that a free flow of blood is [illegible]

after food for 5 days Fortunately, asexual parasites transmitted by blood transfusion are readily exterminated Homologous serum hepatitis—so-called because the condition is much more frequently associated with the administration of serum or plasma than with whole blood—is dependent on infection of the recipient by a hepatitis producing agent, probably a virus in nature, derived from apparently normal donors It is now unquestionably the most significant of diseases transmitted by transfusion therapy The original incidence of between 5 and 10 per cent in patients receiving plasma or serum transfusions has been reduced by diminishing *the size of the pool (maximum of 6–8 donors) from which these blood products are* processed The condition, manifest by jaundice, has an incubation period of from 60 to 90 days after transfusion, an interval which is liable to mask the association between the jaundice and the previous plasma or serum administration unless the possibility is borne in mind Although usually mild in character, homologous serum hepatitis may occasionally be severe and rarely fatal from extensive hepatic necrosis Recognition and elimination of icterogenic batches of plasma and serum depends on the careful recording of the batch number of the product used at the time of transfusion Post transfusion hepatitis may also be caused by the virus of infective [illegible]

[illegible]

dence that irradiation of plasma or serum by ultra violet light before issue may eliminate this type of virus

INTRAVENOUS INFUSION

The fluids in common use are as follows

(1) Isotonic (or normal) saline solution, 0 85 gramme per cent
(2) [illegible]
(3) [illegible]
(4) [illegible] t and glucose 4 0 grammes per cent

In order to avoid febrile reactions due to pyrogens it is essential that all solutions intended for intravenous use be made up with freshly distilled water and autoclaved within 6 hours Scrupulous care must be paid to the cleanliness of all containers

General Indications

[illegible] neither blood nor [illegible] ger Locke solution are employed but their value is only transient

(2) Treatment of water and salt depletion or of either In water depletion, if [illegible]

the use of stored blood.

REACTIONS AND COMPLICATIONS

Transfusion reactions may be classified as (1) simple febrile reactions, (2) haemolytic reactions; and (3) urticarial and other allergic reactions.

Simple Febrile Reactions

Simple febrile reactions, sometimes associated with a definite rigor, occur in from 5 to 15 per cent of the number of transfusions They are most commonly due to foreign protein, dead bacteria (disintegrated or intact), and living but non-pathogenic bacteria derived from the use of unclean apparatus, improperly prepared or stale distilled water for the making up of the diluent, and from delay in auto-

mum Distilled water employed for the solution of dried plasma or serum should

½-1 grain, the dose varying according to the size of the patient and the degree of reaction The patient should be kept warm with hot-water bottles or an electric blanket; also the administration of ½ ounce of brandy by mouth is often beneficial It is now generally recognized that rigors and severe febrile reactions are further reduced in incidence by transfusing the blood or blood product slowly

Haemolytic Reactions

Haemolytic reactions fall into two categories. (1) those due to specific incompatibility between the bloods of recipient and donor, and (2) those due to non-specific causes such as the use of overheated or time-expired blood The former should be excluded by careful grouping and by the additional safeguard of a direct matching test. If

blood is not avail

Rh grouping car

speaking an ABO incompatibility produces a more acute and violent reaction than one due to the Rhesus factor The symptoms of ABO incompatibility include pain in the loin, rigor, respiratory embarrassment, circulatory collapse,

destroy all spores The only chemical disinfectant that can be in any way recommended for syringe disinfection is 70–75 per cent v/v alcohol, immersion of the separate parts of the syringe and of the needle being ensured for not less than 5 minutes

SITE OF VENEPUNCTURE AND CHOICE OF VEIN

A vein in front of the elbow is usually chosen but should the veins be reasonably prominent, a radical in the upper third of the forearm is often entered more easily Features that make veins easier to puncture are (a) large size, (b) not freely mobile or varicose, (c) where two veins join to form an inverted "Y , and (d) at the point where a deep vein comes to the surface In the case of small or invisible veins a suitable one can be frequently located by palpation if a tourniquet or pneumatic band of a blood pressure apparatus be put around the upper arm sufficiently tight to obstruct the venous return, the patient co-operating by opening and closing the hand on some small firm object In very difficult cases warming the limb is often an added help The limb may be immersed in a bath or wrapped in a towel wrung out in hot water to make the skin very warm This will bring much extra blood to the skin and superficial tissues and lead to dilatation of the small superficial veins, especially when the upper part of the limb is constricted In the foot the internal saphenous vein in front of the internal malleolus is difficult for venepuncture on account of its relatively thick wall and diminished lumen, but a vein on the dorsum of the foot may be satisfactory

TECHNIQUE

band of a blood pressure apparatus is placed around the upper arm and constricted to a degree sufficient to obstruct the venous return (in the case of the baumanometer to a pressure of 70–80 millimetres of mercury) The patient is told to clench his hand and the skin over the selected vein on the front of the elbow is cleansed with a suitable antiseptic such as ether or ether soap The vein is now punctured by the needle which is inserted obliquely, bevel downwards, through the skin, the latter being stretched during the procedure by the left index finger of the operator With a successful puncture blood usually enters the needle spontaneously if the venous pressure is within normal limits When sufficient blood has been obtained the tourniquet is released, or the arm band deflated, and the needle withdrawn This order is important so as to avoid a haematoma The patient is then given a sterile wool swab to press over the site of puncture with the thumb of the opposite hand, and haemostasis is usually complete in about 3 minutes No dressing is required

VENEPUNCTURE IN AN INFANT

If it is not feasible to use an arm vein the external jugular vein may be used

Technique —A nurse sits in a chair and holds the infant on her lap with its head lower than its body The face should be held sideways and pointing away from her The external jugular vein is easily seen in this position, and it fills with blood when the head is so lowered, especially during crying The needle of the syringe pointing towards the thorax is introduced where the vein crosses the sternomastoid

in the urine, hypotonic saline solution 0 18 per cent and glucose 4 per cent should be substituted The latter solution is valuable as a routine for the maintenance of water and salt balance after major operations

(3) Restoration of blood chemistry to normal ranges, for example in acidosis or alkalosis In the former condition (bicarbonate depletion), 5 per cent sodium bicarbonate may be given, preferably with normal saline solution to compensate for the fall in the plasma chloride level which occurs as the plasma bicarbonate level rises In alkalosis (plasma bicarbonate in excess) it is usually sufficient to treat the concomitant dehydration and chloride depletion by administration of normal saline solution, when the plasma bicarbonate level will fall as the plasma chloride figure rises Treatment in such cases must be controlled and guided by the requisite laboratory determinations

Technique

It is now customary for all these solutions to be put up in the standard M R C waisted blood transfusion bottle, administration then being carried out with the standard giving unit in the manner already described under the transfusion of blood and blood products With prolonged intravenous infusions, particularly in a restless patient, it is sometimes advisable to cut down and tie a cannula in a vein, such as the internal saphenous at the ankle

Dosage and Rate of Flow

These can only be decided for each individual case It is essential that an accurate fluid balance chart be kept

Reactions and Complications

Febrile reactions with carefully prepared crystalloid fluids are much rarer than with blood, plasma or serum Treatment is as described on page 121 Pulmonary oedema is, however, more liable to occur and should be carefully watched for, particularly in patients with a failing heart The infusion must be stopped at once if signs and symptoms indicative of it arise

VENEPUNCTURE

Choice and Sterilization of Syringes and Needles

All glass syringes are easier to clean and sterilize than those made of glass and metal They are less likely to break on heating and they have no cement to melt in the oven or autoclave If properly cleansed and the piston lubricated with a thin layer of liquid paraffin they may be assembled before sterilization The needles should be of stainless steel A suitable size is a No 14 Record fitting or a No 20 Luer Sharpness of the points is of great importance in ensuring easy and painless venepuncture

Sterilization of all glass syringes is preferably carried out in a hot air sterilizer maintained at 160° C for not less than one hour Autoclaving at a temperature of 120° C (15–20 pounds pressure) for 20 minutes is an alternative method The [illegible]

BONE DISEASES

OSTEOPOROSIS OF THE SPINE

In adults, the maintenance of normal skeletal structure is dependent on the balance of processes of bone formation and resorption Skeletal insufficiency can therefore arise from excessive bone resorption, such as osteitis fibrosa generalisata, or from a failure to convert osteoid matrix into adult bone, osteomalacia, or from a failure of the osteoblasts to form an osteoid matrix, the condition of osteoporosis

In osteoporosis there is no disturbance of calcium and phosphorus metabolism primarily, and the serum calcium and phosphorus are within normal limits The alkaline phosphatase in the blood, which usually indicates the level of osteoblastic activity, is also within the normal range though often in its lower limits

There are a number of conditions which may give rise to osteoporosis In this article the changes in the bones as a result of disuse, of protein starvation, of extreme old age and in Cushing's syndrome will not be considered except when analogy may simplify or explain the present conception of the aetiology and treatment

SO CALLED SENILE OSTEOPOROSIS

There remain for consideration several conditions, which have been largely [illegible]

the main incidence covers a wider range and does not vary much in the three decades from 40 to 70 years

On analysis it is possible to split so-called senile osteoporosis into groups, or perhaps better to select from the whole group two entities, namely (1) post menopausal osteoporosis and (2) pre senile osteoporosis, both of which respond to endocrine therapy

A number remain which are at present quite unexplained in this idiopathic group are included the patients who show these changes after anti syphilitic treat ment Up to the present no specific treatment appears to influence this group

PHYSIOPATHOLOGY

In a consideration of the rational treatment of this disease, which consists essentially of a failure of endosteal bone formation, one must consider what factors influence both the formation and resorption of such bone Endosteal or appositional bone laid down both in the cortex and bone trabeculae is due to osteoblastic activity forming osteoid matrix, into which is deposited the calcium phosphorus complex, which completes the elaboration of adult bone

Puncture of the anterior fontanelle, which is normally patent until 15 months of age in infants, is not devoid of danger and is not recommended for routine use

APPENDIX

NEEDLES

Collecting type —Stainless steel, size 2 4 millimetres in diameter by 35 millimetres in length, olive mount, Record fitting, short bevel point, polished inside and outside

Administering type —Stainless steel size 1 5 millimetres in diameter by 35 millimetres in length, olive mount, Record fitting, short bevel point, polished inside and outside

It is imperative that all needles for venepuncture be sharp and the point of each should be scrutinized with a hand lens before incorporating in a collecting or an administering set Important criteria are a short sharp straight point, gradual sloping bevel, absence of shoulder and absence of burr Care should be taken to preserve the point by protecting the needle immediately after use Attention to sharpness facilitates the procedure for the operator and renders it devoid of pain both for donor and patient

H F BREWER

and it would appear that this is due to an increase in growth generally a process in which the bones participate It is perhaps significant that most patients with either post menopausal or pre senile osteoporosis seem to be spare in build, often un usually so, and even in the occasional obese type muscular tissue is singularly reduced

Osteoporosis then as a post menopausal or pre senile disease, is an exaggeration of the normal changes coincident with the decline of gonadal activity This process also either produces or conditions impairment of adrenal function As a result there is a decrease of osteoblastic stimulation, in addition to the more generalized manifestations of sex hormone deficiency Coincident with this there is a decrease in the nitrogen retaining and protein anabolic action of the androgenic substances from the gonads in the male and the adrenal glands in both sexes The nitrogen balance tends to become negative and growth in all tissues diminishes as a result of the lack of available protein material Growth of bone is impaired as an integral part of this process This osteoporosis due to decline of gonadal activity is increased by the fact that as tissues age the growth rate undoubtedly becomes slower and the response to stimulation less adequate The decline in physical activity and loss of stress stimulation to bone formation increase the osteoporosis still further as age advances Lastly the abrupt and earlier deterioration of gonadal activity in the female and subsequent more generalized endocrine disturbance would account for the preponderance of females over males with osteoporosis

TREATMENT OF POST MENOPAUSAL AND PRE-SENILE OSTEOPOROSIS OF THE SPINE

The treatment of post menopausal osteoporosis of the spine now described has been evolved from the foregoing considerations Results have been very satisfactory and the symptoms are rapidly brought under control As yet, however, there is no convincing evidence by x ray examination that bone density has been markedly improved although deterioration is prevented

Immobilization

Immobilization has been used considerably in the past, by rest in bed or in a [illegible]

because either immobilization or fixation removes to a large extent the natural strain and stress on the bone which appears to be one of its main stimuli to osteo blastic activity In addition it is easy to superimpose atrophy of disuse and so [illegible]

capacity without artificial support

Diet

An ordinary varied diet is prescribed and it is important to ensure that it is adequate especially in respect of its protein and vitamin content In addition at least 10 000 units of calciferol are given daily

Osteoporosis can only result from failure of osteoblastic activity. The osteoblasts could be relatively destroyed and this may be the cause in some degenerative cases after the use of anti syphilitic treatment There is, however, no direct evidence for this.

RECOGNIZED CAUSES OF OSTEOPOROSIS

There is no doubt that in normal circumstances stress and strain tend to increase bone formation and it would appear that stress can increase osteoblastic activity. The lack of such stress can produce a marked change, as in disuse, but in spinal osteoporosis symptoms arise first during a life of full activity when stress and strain in the spine must be considerable and therefore this explanation does not hold good Osteoblastic failure is also seen in conditions of malnutrition, when there is deficiency of protein intake An examination of dietary intakes, however, has shown that in the main the intake of food by the patients now under consideration does not differ materially from that of the population as a whole.

Endocrine Failure

Animal experiment provides evidence of hormonal influence on osteoblastic

more, after the menopause some degree of osteoporosis is frequent and it seems to increase progressively as time passes. When the rate of increase is unduly rapid, premature excessive osteoporosis results The vertebrae become excessively softened and deformed as a result of indentation by pressure from the intervertebral discs, assuming a greater or less degree of biconcavity Collapse may also occur in one or more vertebrae, either complete or, commonly, mainly anteriorly

hormones

In view of the suggested stimulating action of oestrogen on bone growth, studies of the effect of oestrogen on calcium metabolism have been undertaken by the author and other workers

These studies have shown that in post-menopausal osteoporosis and also in presenile osteoporosis in men oestradiol has a profound effect on the calcium balance and causes calcium retention It is assumed that this results from an increased osteoblastic activity Time and further experience will provide the final explanation Coincident with the decline in oestrogen production, or possibly conditioned by this decline, there tends to be a fall in the production of androgenic substances

shown to influence nitrogen metabolism as well as the metabolism of calcium and phosphorus

Testosterone administration produces a marked retention of nitrogen as well as of calcium and phosphorus An increase in body-weight accompanies this retention

intramuscularly in doses of 2–3 milligrams 3 times a week, or stilboestrol 0 5–1 milligram daily is given by mouth Every 4–6 weeks the treatment is stopped for 2 weeks to allow for uterine haemorrhage A careful watch is kept for the occurrence of oedema and should this occur treatment is stopped for 3 weeks, if it is essential to start again, treatment is begun again with half of the previous dosage It may be possible to utilize the implantation of pellets for this purpose but the author has no experience of this method

Relative merits

There is no doubt that symptoms can be alleviated satisfactorily by the use of oestrogen It is, however, more troublesome to use than testosterone, and although the combination of testosterone and oestrogen may prove in the end to be more efficacious, at the present time it seems that the effect of testosterone, if it can be used clinically in adequate doses, is perfectly satisfactory and this avoids the trouble and precautions involved in oestrogen therapy

E F SCOWEN

PAGET'S DISEASE

CLINICAL DESCRIPTION

Paget's disease (osteitis deformans) was first described in 1877 by Sir James Paget, of St Bartholomew's Hospital, London The condition usually makes its appear ance after middle life and is characterized by gradual enlargement of the skull and thickening and bowing of the long bones, particularly of the femur and tibia Other bones that may be affected are those of the vertebrae, pelvis, ribs and clavi cles The disease may be practically generalized, may affect only a few bones or may be limited to only one bone It is described as a "rarefying osteitis", but it is very doubtful whether the process is truly inflammatory The changes consist essentially of areas of osteoporosis with increased bone formation under the periosteum In spite of the increased density and thickness which the latter process causes, the bones have an abnormal fragility and a plasticity which results in deformities The aetiology is unknown The disease is slowly progressive, but in itself does not shorten life Sarcoma, however, may arise in the affected bones

TREATMENT

There is no treatment known at present which improves the disease or affects its course Calcium salts, Parathormone and vitamin D were advocated in the past

the deformity, but in abolishing the pain

A W SPENCE

Paget, J (1877) *Med-chir Trans*, 60 37
Watson, E M (1939) *Canad med Ass J*, 41, 561

ENDOCRINE THERAPY

Specific treatment by hormone therapy has proved of immense benefit and [illegible] combined effect of oestrogens and androgens [illegible]

Testosterone

The treatment is begun by the administration intramuscularly of 50 milligrams of testosterone propionate on alternate days This course is continued for 2–3 months and if no signs of masculinization occur it is possible to continue such therapy for a year or even 18 months Should, however, the multiple injections prove too great a disadvantage after the first course, implantation of pellets of testosterone may be done, implanting 200 milligrams of testosterone every 3 months It is advisable if implantation is used that a control estimation of the 17-ketosteroids in the urine should be made at regular intervals and if the figure declines towards the low figure usually present before treatment then further implantation or enhancement by intramuscular injection should be given

There is great variation in the susceptibility of these patients to the masculinizing effect of testosterone and in consequence the dose which can be used will vary. After the first 6–12 months of treatment, provided the result is entirely satisfactory in the alleviation of symptoms, the hormone can be continued by the oral administration of methyltestosterone in a dose of from 10 to 20 milligrams daily, the dose range again being chosen on the known susceptibility of the patient to the masculinizing effect

With this treatment the pain and discomfort are considerably or completely relieved within a few weeks or months There is usually an increase in body-weight [illegible] Oedema does [illegible] there may be a [illegible]

Oestrogen therapy

In view of the theoretical advantages of the combined use of oestrogens, oestrogen therapy [illegible] treatment As a general rule this is [illegible]

[illegible] gesterone may be given periodically to induce haemorrhage Irregular haemorrhage may occur in spite of these precautions and this often causes difficulty, as it cannot be assumed that such irregular haemorrhage is the result of therapy and it may need further investigation

[illegible]

the author's practice therefore to reserve the use of oestrogen to those patients in whom adequate treatment with testosterone is not possible owing to masculinization One of two preparations is used, oestradiol benzoate can be injected

intramuscularly in doses of 2–3 milligrams 3 times a week, or stilboestrol 0 5–1

start again, treatment is begun again with half of the previous dosage It may be possible to utilize the implantation of pellets for this purpose but the author has no experience of this method

Relative merits

There is no doubt that symptoms can be alleviated satisfactorily by the use of oestrogen It is, however, more troublesome to use than testosterone, and although the combination of testosterone and oestrogen may prove in the end to be more efficacious, at the present time it seems that the effect of testosterone, if it can be used clinically in adequate doses, is perfectly satisfactory and this avoids the trouble and precautions involved in oestrogen therapy

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TREATMENT

There is no treatment known at present which improves the disease or affects its course Calcium salts, Parathormone and vitamin D were advocated in the past, ... has been ... that it ... ienced ... by the bending of the bones Osteotomy of the tibia is of value, not only in correcting the deformity, but in abolishing the pain

A. W. SPENCE

Paget, J (1877) *Med-chir Trans*, 60, 37
Watson, E M (1939) *Canad med Ass J*, 41, 561

CANCER

PROPHYLAXIS

Knowledge of the essential cause of cancer is not sufficiently advanced to admit of the use of preventive measures directed against the specific agent or agents Nor is there as yet any rational measure that can be taken on hereditary lines

Of extrinsic (environmental) factors, however, though the gaps in knowledge are considerable, there is evidence that quite a number exist and that several of them produce what are called pre-cancerous lesions Among these factors are "chronic irritation" of any kind, actinic and radioactive rays, the prolonged use of certain hormones, and vitamin deficiency Amongst the lesions may be mentioned a number of "benign" skin conditions, leucoplakia, chronic mastitis and cervicitis, and peptic ulcer

It is extremely difficult to decide how radical treatment should be in face of a number of pre-cancerous lesions—for example, in papillomas of the skin, in inflammatory lesions of the breast and in leucoplakia Wisdom probably lies in a careful consideration of each individual case in relation to the patient s age

Short of radical treatment (that is, by surgery) of the above-named lesions there is rather a severe limit imposed by modern life upon the preventive measures often

stomach, again, 'the chronic irritations to which [this organ] is subjected are almost too numerous to mention—thermal chemical, and mechanical' (Adair, 1947) But to avoid foods that are too hot or too cold, that are eaten and drunk hurriedly, and in excess, would entail living like an anchoret

RADICAL REMOVAL

SURGERY

removal of the growth by this method is equally complete, (b) cases in which the neoplasm is too deep-seated or too extensive to be reached effectively by surgery, and (c) cases in which the cancer has led to scattered metastases

In relation to (b) it should be noted that by improved technique, strategic skill, avoidance of shock not only during the operation but by pre operative and post operative measures, and perhaps especially by the advances made in anaesthesia, the surgeon is able to deal effectively with a number of cases which would not have been so dealt with previously Blood transfusions during prolonged operations and the pre-operative administration of the sulphonamides or penicillin or of both to

avoid infection, should also be given credit in the general advance that surgery has made in this field

The oesophagus and the pancreas are among the most striking instances of organs in which carcinoma is now being radically dealt with, and with slowly increasing success Pulmonectomy in the early stage of cancer of the lung is another example of a radical procedure that has become more frequently practicable

IRRADIATION

Two methods of irradiation are now in use, (a) the *gamma* rays of radium, filtering off the *alpha* and *beta* rays by means of a platinum filter, and (b) x rays

Malignant growths adaptable to radium treatment are epitheliomas of the tongue, the lip and the cervix uteri In rodent ulcer and surface lesions of the skin this is also the method of choice

X-ray therapy is adopted when inoperable growths are under consideration High voltage is chosen The 1,000,000 volt installation at St Bartholomew's Hospital has taken the practice of x-ray treatment a definite stage forward The results in the treatment of inoperable cancer of the rectum have been strikingly good Voltages much higher than this, even up to 20–50 million volts, are now on trial Such high voltages are given by the betatron and the linear accelerator

COMBINATION OF SURGERY WITH IRRADIATION

Surgery combined with irradiation is a method which has been considerably developed of late years, and to the special credit of British surgery and radiotherapy A number of cancers which, from their extent or from their adherence to vital structures, are not removable surgically, may become so after x ray treatment Following surgical removal, a course of x ray applications may be used as a prophylactic measure against recurrence Surgery may be necessary in order to carry out radium implantation

HORMONAL TREATMENT

The most striking advance in the treatment of cancer by other than surgical and irradiation methods has been the control of the disease in the prostate gland by the use of stilboestrol or its equivalents Stilboestrol is a synthetic oestrogen (Dodds, and his colleagues, 1938) The claim made by Huggins and Clark (1940) that its administration by mouth controlled prostatic carcinoma and also, in many cases, its bony metastases, has been fully confirmed Dodds considers that the behaviour of this substance is equivalent to "biochemical castration" through its action on the pituitary gland

The dosage is 1 milligram 3 times a day, but the amount administered must be modified when mastitis occurs Stilboestrol therapy may also be controlled by determining the amount of serum acid phosphatase, which has a normal upper limit of 3 2 units per 100 millilitres The level ranges from 5 to 10 units in prostatic carcinoma, higher levels indicate the presence of metastases

Following this experience with oestrogenic compounds the use of androgens in inoperable cancer of the breast in women has been tried The results have been encouraging The substance of election is testosterone propionate It is claimed that the primary growth undergoes partial resorption and that metastases occur with less than the anticipated frequency To get these results very large doses are

CANCER

PROPHYLAXIS

Of extrinsic (environmental) factors, however, though the gaps in knowledge are considerable, there is evidence that quite a number exist and that several of them produce what are called pre-cancerous lesions Among these factors are "chronic irritation" of any kind, actinic and radioactive rays, the prolonged use of certain hormones, and vitamin deficiency Amongst the lesions may be mentioned a number of "benign" skin conditions, leucoplakia, chronic mastitis and cervicitis, and peptic ulcer

It is extremely difficult to decide how radical treatment should be in face of a number of pre-cancerous lesions—for example, in papillomas of the skin, in inflammatory lesions of the breast and in leucoplakia Wisdom probably lies in a careful consideration of each individual case in relation to the patient's age

Short of radical treatment (that is, by surgery) of the above-named lesions there is rather a severe limit imposed by modern life upon the preventive measures often

stomach, again, "the chronic irritations to which [this organ] is subjected are almost too numerous to mention—thermal, chemical, and mechanical' (Adair, 1947) But to avoid foods that are too hot or too cold, that are eaten and drunk hurriedly, and in excess, would entail living like an anchoret

RADICAL REMOVAL

SURGERY

removal of the growth by this method is equally complete, (b) cases in which the neoplasm is too deep seated or too extensive to be reached effectively by surgery; and (c) cases in which the cancer has led to scattered metastases

In relation to (b) it should be noted that by improved technique, strategic skill, avoidance of shock not only during the operation but by pre-operative and post-operative measures, and perhaps especially by the advances made in anaesthesia, the surgeon is able to deal effectively with a number of cases which would not have been so dealt with previously Blood transfusions during prolonged operations and the pre-operative administration of the sulphonamides or penicillin or of both to

apply " a dusty answer gets the soul, when hot for certainties in this our life!' The question is easy, again, when it is obvious that "the truth" would sap the patient's morale and kill him quicker than would his disease, perhaps at a time in its natural course when given good general resistance, a concerted plan of treatment might produce results that are well worth while

Between these extremes come the majority of cases It is the duty of the doctor to watch them closely and to judge them individually It is often easier to condone a lie than it is to condone evasion, and yet evasion is the psychological background accepted by both parties, against which treatment proceeds until a time arrives when "certainties" no longer seem to matter To those whose experience of these patients is small all this may seem quite wrong *There is an itch in some of us to say* the patient "ought to know", but that is the view of a person in health Mortal illness changes a patient s outlook, and maybe his mind, often too he really knows and does not want or need to be told The patient s right to live is a paramount guiding principle and no consideration of whether the onlooker would himself ' rather die ' should influence the doctor To "rather die" comes more easily to the lips of the well than the ill person, the value of life is not to be judged objectively but subjectively

Most patients with "incurable" cancer prefer home to hospital treatment But there should be a certain number of beds in every large hospital into which those patients whose home conditions make proper treatment and care impossible can be admitted Such a provision not only benefits the patient, it is of great service to the student and to the nurse

The patient's nutritional state calls for attention So does the anaemia which is so often present Although cancer "cachexia is not entirely a matter of associated sepsis, sepsis should be sought for and combated

Pain

The use of surgery or irradiation or both as palliative procedures especially for pain, should be considered, and the field for drug administration is larger than is [illegible]

useful preparation for pain in cancer

Sooner or later, however, morphine becomes necessary in many cases It is important to distinguish between actual pain on the one hand and weariness with insomnia on the other, for although morphine is euphoric as well as narcotic its use should be postponed as long as possible if a trial of simple sedatives and hypnotics such as bromides, chloral paraldehyde and the barbiturates succeeds

The oral route should be chosen for morphine (in $\frac{1}{8}$–$\frac{1}{4}$ grain doses) and maintained for as long as good effects are obtained This route produces less marked results than are produced from the same dose given hypodermically, and is slower in action In the use of morphine the principle should always be to give as little of the drug as necessary, consistent with controlling the pain The ill effects are nausea and constipation Some patients respond better to one or the other of two alternatives Dilaudid or Eukodal Both are codeine derivatives

Finally, let it be said that there is so much that can be done for the patient with

. . . . . noted by Adair and Herrmann (1946) the doses hese investigators observed utism and deepening of the

CHEMOTHERAPY

. . . . . result from the use of certain . . . of . . osi- . ne. . of the drugs were necessary to get even these results . . . . . . ooler and

by the use of the remedy

Among the substances which have been tried more recently are colchicine, urethane, Teropterin and the nitrogen mustards Of colchicine there seems little good reported, and the degree of malaise induced does not justify its use Urethane has proved of service in the treatment of chronic leukaemia (especially in the myelogenic type), though probably not more so than irradiation as at present applied Of the nitrogen mustards the reports are more encouraging. They have *the authenticity of the Committee on Growth of the National Research Council in* . . . . . . 70 per cent of cases treated . . Remissions rarely . regression occurs in 50 per cent of cases, but this is never complete and is always transient In myeloid leukaemia, though full remissions can be induced, these are of shorter duration . . . . treatment The drug is contra indicated in lymphatic . . , of the use of Teropterin under controlled

PALLIATION

There is probably no more searching test of a doctor's efficiency than his conduct of a case of cancer which . . . treatment Starting with here quite vital "You'll . is almost always implied The request and its observance are, in effect, the essence of good doctoring

. . . . . stion is a common . . . . . *when the patient, confidence being mutual and complete, asks quite simply and with his mind well* balanced But not every one who says, "Tell me the truth" can stand it From many who cannot the question comes too early and too glibly It may even come before the doctor himself is sure, for surety means histology To be sure is often of greater importance to the doctor than to the patient, to whom, not seldom, the words

which affect the growing tumour through modification of the endocrine environment, and secondly of those with direct cytotoxic or similar properties of varying degrees of cell specificity

CONTROL OF CANCER OF THE PROSTATE BY OESTROGENS

According to Riches (1948) *there are two clinical varieties of carcinoma of the* prostate first the primary scirrhus and secondly the adenocarcinoma arising in a gland which is the seat of benign hypertrophy The former usually starts in the posterior lobe and is easily recognized as being malignant from the outset it occurs at a younger age than the adenocarcinoma and is more lethal The second type may not be discovered until the gland *is examined microscopically after its removal* for benign hypertrophy, and the patient may then live for several years without other treatment before developing a recurrence it is this type which yields better statistical results after oestrogen therapy than after any other method of treatment Since however there need be no marked histological differences between the two, and the distinction is largely clinical, most statistics group them together and so render the assessment of results open to misinterpretation None the less valid statistics are now becoming increasingly available which leave little doubt that so-called endocrine control of cancer of the prostate by means of oestrogen therapy produces a significant extension of the expectation of life and in particular reduces the alarming mortality of the first year in cases with dissemination As however the period of observation lengthens, the mortality figures in various oestrogen [illegible] approach more closel[illegible] the val[illegible]es [illegible]n comparable control series In [illegible] as [illegible]

Treatment and Results

In the management of a case, the serum acid phosphatase should be estimated [illegible] and may be an ind[illegible]cat[illegible]on of re[illegible]activation of the disease or of further [illegible] the greatest [illegible]sage should be 1 milligram three times daily, to begin with, increasing to 5 milligrams three times a day, at which level it remains for a variable number of weeks or months although *in individual cases it may be judged* necessary to give a total of 20–30 milligrams daily An adequate maintenance dose is then assessed by the general and local condition and by the level of serum acid phosphatase It should not, if possible, be less than 1 milligram three times daily and may require to remain at 5 milligrams thrice daily in order to minimize the risk of delayed reactivation In any event the most important feature of dosage is that the prescribed oestrogen must be taken regularly and continuously for the remainder of life, and this fact should be impressed upon both the patient and his attendants

Apart from some 7 5–10 per cent of cases which completely fail to respond evidence of improvement is usually prompt Symptomatic benefit is apparent in 80 per cent, is maintained for over a year in 50 per cent, and most often consists in dramatic relief of metastatic or sciatic pain, with improvement *in micturition and*

incurable cancer that it is a triumph of good doctoring and nursing to bring the patient through the sometimes long approach to death in peace to the very end.

HORDER

Adair, F E (1947) *Bull N.Y. Acad Med*, 23, 383

THE CHEMOTHERAPY OF CANCER

INTRODUCTION

has passed outside the field of local attack when the patient first comes for treatment (Patey and Dyson, 1948) However, the attainment of effective chemotherapy is hindered by circumstances of a special kind, all of which reflect the unique position of cancer in pathology The main difficulties arise from the fact that the cancer cell is but a modification of the normal, that conversion to malignancy may be due to a re-orientation of enzyme constitution quite unaccompanied by any gross changes affecting protein structure or immunological specificity, that there is on this account no protective reaction on the part of the body such as occurs in infec-

such as the nitrogen mustards and urethane, which produce some at least of their effects upon the cancer cell directly, or by those which bring about alteration of its *milieu* by endocrine means The reader is further referred to such recent general accounts as that of a discussion on the chemotherapy of malignant disease held at the Royal Society of Medicine (1948), the symposium published by the American

gistic or additive activity of chemotherapeutic compounds in cancer, with one another or with radiation The present account is based upon clinical experience thus far, and is confined to the more practical aspects of the use first of those agents

therapy and furthermore that a rise in alkaline phosphatase is not necessarily a safe criterion of response to treatment since it may be due to the spread of osteoplastic metastases rather than to the repair of osteolytic lesions Although only a small proportion of cases can be expected to improve when there is local recurrence or spread to liver, lungs or brain administration of massive doses of testosterone may be followed by striking if temporary regression as for instance of involved supraclavicular, cervical and axillary nodes and of skin nodules after total doses of the order of several grammes given over a few weeks such regression may be accompanied by deposition of fibrous tissue and by cytological changes in the tumour cells for example hydropic changes in the cytoplasm and nuclear pyknosis It is of interest that Fels (1944) records the disappearance of a large uterine fibroma coincident with androgen therapy for cancer of the breast

Considerable variation may be expected in the speed with which the above therapeutic effects become manifest thus relief of pain may be evident within a

The benefit to be derived in any given case is uncertain and always unpredictable and its duration is difficult to forecast but it should be noted that the bulk of *successes occur in women still menstruating (in contrast with the results from* oestrogen therapy) although great improvement may also be noted in older women It is probable that response is correlated with histological grade tumours of lower grades responding more favourably

DETAILS OF TREATMENT AND RESULTS

Therapeutics

Testosterone testosterone propionate or methyltestosterone should be used these are administered by subcutaneous implantation of pellets or crystals by intramuscular injection or by the sublingual route respectively Although subcutaneous implantation is by far the most economical method when successful it ... It cannot be predicted and hence

anterior abdominal wall or over the scapu

it should by this method approximate

Implantation should be repeated in 4-6

100–150 milligrams of testosterone propionate should be given thrice weekly 8–10 weeks or even for much longer periods if this can be achieved with a main tenance dose of 150 milligrams weekly thereafter

Of great theoretical interest is the recent account by Adair (1949) of a case in

sist of testicular atrophy impotence tender enlargement of the breasts and pig

associates 1944) although the evidence is conflicting (Greene 1946)

of the prostate has been discussed

by d later papers have described the

sq nges occurring in the normal and

preferred the latter measure being reserved for those patients intolerant to oestro gens or those who have relapsed under oestrogen therapy Whatever the mode of action the results however satisfactory fall far short of establishing a cure although the literature mentions one patient (Dean 1947) with histologically proven prostatic carcinoma who died 4 years after the institution of androgen control but without microscopic evidence of the disease being detected at necropsy Finally and even assuming the best type of response to treatment the condition should still be regarded as a surgical one and in the majority of cases some form of surgery is needed to ensure the best results

Sequelae

A few recent papers refer to a relatively long term sequel to oestrogen therapy which has both fundamental and practical interest namely the development of gynaecomastia and cancer of the breast in the male either coincident with or subsequent to the prolonged administration of oestrogens (Howard and Grosjean 1949 Gardini 1948 Abramson and Warshawsky 1948) The question is one with

OESTROGENS AND OVARIECTOMY IN CANCER OF THE BREAST

in cancer of other sites and particularly of the breast Thus in recent years contributions have been made on castration for advanced malignant lesions (Howes 1944

and his associates (1946) and by Jacobson and his colleagues (1946). Jacobson and his colleagues obtained encouraging results in Hodgkin's disease mainly, failure being encountered in acute leukaemia and multiple myeloma, the results in the majority of cases of myelogenous leukaemia being unsatisfactory. Later, Spurr and his co-workers (1947) recorded symptomatic control in several cases of Hodgkin's disease in a series of 29 cases which were observed over periods ranging from 3 months to 3 years: 94 per cent of 120 courses of treatment resulted in significant remissions; 9 cases of chronic lymphatic leukaemia showed remissions of between 2 months and 2 years, but 5 had died after 18 months. Remissions were also observed in 4 of 6 cases of lymphosarcoma, and in 7 cases of polycythaemia rubra vera, but there was no relief even of symptoms in acute leukaemia and only transitory effects in chronic myeloid leukaemia. In a general review of the use of the nitrogen mustards in the treatment of neoplastic disease, Rhoads (1948) drew attention to the similarity of their effects to those of x-rays, and pointed out that they are in no sense curative for any type of cancer so far studied, and that the tumour regressions induced are only temporary, and rarely persist more than several months. From the above and the more voluminous recent literature (Karnofsky, 1947; Zanes, Doan and Hoster, 1948, Craver, 1948) it is apparent that clinical responses are largely confined to the spectrum of neoplastic disease involving the reticulo-endothelial system—the leukaemias, multiple myeloma, lymphosarcoma and reticulum-cell sarcoma, Hodgkin's disease, giant follicular lymphoblastoma, polycythaemia vera, mycosis fungoides, Boeck's sarcoid and other but rarer allied conditions—although palliative effects have also been recorded in un- [illegible] his col- [illegible] 1948). [illegible] ullum- [illegible] disease [illegible] e-third showing no response or only minimal response, one-third showing moderate to [illegible]

[illegible] favourable circumstances the beneficial effects are often early and marked, for ex- [illegible] of enlarged nodes (often with- [illegible] ature [illegible] plica- tions as caval obstruction and neurological involvement may be relieved, although [illegible] lesions, as might be expected, do not be observed in a proportion [illegible] ective response to the nitro- [illegible] sponse to x-rays However, [illegible] ich the nitrogen mustards represent, a general comparison of the two methods shows that radiotherapy is still preferred for the first treatment, and is certainly indicated (with surgery) for those [illegible] confined to one group of nodes or is still regional and [illegible] ay irradiation is [illegible]

which relapse occurred after a prolonged remission, in spite of continued treatment with massive doses of testosterone propionate, and in which cessation of treatment was quickly followed by improvement maintained for many months

Side-effects

The chief side-effects may be classified as oestrogen-withdrawal effects, signs of masculinization, and metabolic changes Oestrogen-withdrawal effects may be observed within the first month of treatment, and consist of hot flushes, regression of the endometrium with suppression of the menses, and conversion of the vaginal epithelium to the "oestrin-deficient" state—changes also met with following surgical castration, and, somewhat later, in cases of x-ray induced castration Despite massive doses of testosterone propionate, amenorrhoea may persist for only one period following androgen withdrawal. Signs of masculinization may become prominent in the later stages of treatment, but are by no means a necessary condition of its success. They consist, in order of appearance, in coarsening and increased sebaceous activity of the skin, acne, facial hirsuties and increased growth of hair on the limbs with huskiness of the voice and enlargement of the clitoris accompanied by increase in libido Other signs and symptoms are to be ascribed to metabolic changes such as re-mineralization of the bones, and retention of water,

indicates that androgen therapy should be used with care in patients having cardiovascular disease

crease the survival proportions at 3, 4 and 5 years by a considerable factor which may be as great as 100 per cent

NITROGEN MUSTARDS IN THE THERAPY OF HODGKIN'S DISEASE, THE LEUKAEMIAS AND RETICULOSES

Among the many new compounds originally prepared for the purposes of chemical warfare special interest attached to *bis*(β-chloroethyl)amine and *tris*(β-chloroethyl)amine, as nitrogen analogues of mustard gas or so-called

plastic haemopoietic and other tissues have been extensively studied by others (Spitz, 1948, Bloch and his colleagues, 1948, Cornell and Blauw, 1949) Clinically, Gilman and Philips (1946), with their collaborators Goodman, Lindskog and Dougherty, were the first to investigate the effects of a nitrogen mustard (*tris*(β-chloroethyl)amine) in malignant disease in man, and were followed by Goodman

leakage occurs into the subcutaneous tissues To obviate the risk of venous thrombosis, injection should be carried out slowly (over several minutes) and many prefer that it should be made through the rubber tubing of an intravenous medication apparatus already delivering normal saline solution Although in patient treatment is probably ideal, the majority of cases can be satisfactorily treated as out patients provided they return home immediately, and before the onset of nausea or vomiting Some workers claim that the severity of the vomiting can be reduced by the intra

reticulocyte, platelet and differential counts Dosage is in the range 0 1–0 2 milligrams per kilogram of body weight on consecutive or alternate days to a total of 3–6 doses and is varied in individual cases according to the blood picture (particularly the leucocyte count) and to the response to previous doses or courses For guidance it may be said that the average total dose for a single course is in the

milligram per kilogram on each of 4 successive days) It should also be noted that a dose of 0 2 milligram per kilogram on each of 4 successive days tends in general to give an unduly severe degree of leucopenia Following completion of the first course doses of 0 1 milligram per kilogr

or 2 such doses may be given every 2–4

must depend upon the clinical conditior

particular

Side-effects

The most frequent side-effects in nitrogen mustard therapy are nausea and vomiting, which may be encountered in over 90 per cent of cases, they start within 1–4 hours of injection, last 24–48 hours and are severe and persistent in some 5 per cent of cases The patient should be informed and reassured beforehand, and it should be noted that the first one or two infusions usually produce more nausea

Some 7 per cent of cases do not show any of the reactions above described Cerebral toxic effects may be observed with certain congeners of HN2 but practically

So far as changes in the blood picture are co

varied accounts of the sequence of events but the general consensus of opinion is that lymphopenia is the first and may be the most persistent haematological change Reduction of lymphocytes begins within a day or two of the first injection with a relative increase of granulocytes Lymphopenia is followed by neutropenia a general leucopenia developing within a few days to a few weeks of the start of treatment during this period approximately half the number of cases receiving a

In the leukaemias and lymphosarcoma (Spurr Smith and Jacobson 1948 Myers Craver and Karnofsky 1949) response to nitrogen mustard therapy is in general less encouraging than in Hodgkin s disease although remissions are reported of between 1 and 10 months for lymphosarcoma 2 24 months for chronic lym

Kierland Watkins and Shullenberger 1947) The first effect may be relief of pruritus followed by softening of tumour nodules disappearance of infiltrated plaques and betterment of the general condition Osborne and his colleagues (1947) mention a case of chronic disseminated lupus erythematosus treated under the erroneous impression that the patient s cond t on was the pre mycotic stage of

probably less than can be achieved in the same condition by administration of radioactive phosphorus In bronchogenic cancer (Benda and his colleagues 1948 Skinner Carr and Denman 1948 Boyland and his associates 1948) as already indicated the nitrogen mustards may produce transient symptomatic and occasional objective improvement in 50–70 per cent of inoperable cases—relief of dyspnoea *and cough decrease of sputum and of haemoptysis increase in appetite and weight* Occasionally both primary tumour and metastases may show some decrease in size and re aeration may follow absorption of pleural effusions with occasional relief of chest pain and of vena caval obstruction In these cases it is doubtful to

courses only exceptionally continue to produce equally good responses and there is no certain and usually no apparent prolongation of life

CLINICAL DETAILS

Therapeut cs

The nitrogen mustard of choice and the most commonly employed is methyl *bis*(β-chloroethyl)amine or HN2 the corresponding *tris* compound (HN3) is certainly more toxic and its further use probably unwarranted The drug is adminis tered intravenously as the hydrochloride in aqueous or saline solutions which should be freshly prepared Solutions should be handled carefully on account of their vesicant properties and during injection it is important to ensure that no

expectation of life is more than twice that in the latter Accompanying these changes and similar alterations in the bone marrow, reduction is observed in the size of the spleen and in some instances it becomes impalpable An increase in the uric acid content of the urine may be noted in the early stages of treatment, with reduction in the blood uric acid if this has been elevated Great variation may be observed in the time required for the blood picture to become more normal, for example, from a few days to 2 months or over, when total doses ranging from a few grammes to 200 grammes or more of urethane are given.

CLINICAL DETAILS

Therapeutics

Urethane may be administered orally, by intramuscular or intravenous injection, [illegible] three to ten [illegible] would appear to have no advantage [illegible]

is used for intramuscular injection if required, while in the case of intravenous medication 1–2 grammes of urethane are dissolved in 20 millilitres of sterile normal saline solution or distilled water, mixed with 200 millilitres of sterile saline solution, *and administered over a period of 15–30 minutes While 1 gramme thrice daily in* syrup has been the dose most commonly employed by mouth, Piney (1947, 1948 [illegible] for example 0.5 gramme 3 or 4 [illegible]

controlled by complete blood counts each week The longest recorded time of continuous urethane treatment is apparently over *18 months (Claudy, 1949)* at levels of 2–5 grammes daily, while Piney describes another case of chronic myeloid leukaemia in which conception occurred during urethane therapy, which was continued throughout pregnancy to the delivery by Caesarean section of an apparently healthy baby· one month after delivery the total urethane dose reached 900 grammes Despite a minute amount of urethane excreted in the milk, the leukaemic mother can safely feed her child Although by no means simple in practice, a method described for the estimation of urethane in the blood (Archer and his [illegible] therapy. In this [illegible]

tion with acid potassium [illegible] after addition of potassium iodide From the use of [illegible] can be main- [illegible] ministration by mouth of 1–3 grammes of the drug

Side-effects

Of the side-effects induced by urethane, nausea is the most frequent, but should not be regarded necessarily as an indication to interrupt treatment, and it can be minimized as indicated above Transient drowsiness, slight giddiness and gastro-intestinal irritation are also encountered but are seldom troublesome *Other toxic*

total dose of 25 milligrams of HN2 have white-cell counts of 2,000 per cubic millimetre or less Penicillin may be used *in granulocytopenia, but experience indi* cates that few agranulocytic lesions develop even in cases with extremely low leucocyte counts While the platelet count may be stimulated initially, thrombo-

noted that deleterious blood changes secondary to the use of the nitrogen mustard are rather less frequently observed in Hodgkin's disease and lymphosarcoma than in the leukaemias Recovery from such changes is usually complete after a varying interval, and is much more rapid than that following total body exposure to an equivalent effective dose of x ray irradiation

Notwithstanding a great deal of chemical investigation, no compound has yet emerged which is clearly more efficacious than HN2, although several aromatic

more practical advances may flow from them as a result

THE ACTION OF URETHANE IN LEUKAEMIA

The events which led to the clinical investigation of the action of urethane in leukaemia have already been recounted elsewhere (Haddow, 1947) From the results (Paterson and her colleagues 1946 and 1947) it became apparent that urethane is capable of producing remarkable changes in leukaemia represented in the most favourable cases by a fall in total leucocyte count to normal limits, a tendency for the differential count to approach a more normal pattern, diminution in the size of the spleen and of enlarged lymph nodes, and a rise in haemoglobin level There is a striking similarity between such responses and those brought about by x-ray therapy, but, equally, no indication that permanent benefit may result from the use of urethane in either myeloid leukaemia or lymphatic leukaemia, because relapses take place immature cells may reappear in the blood and all these changes are essentially reversible A very large number of clinical reports has now appeared, which confirm these conclusions very fully but do little to advance the difficult problem of the mode of action of urethane (Dustin, 1947, Watkins, Cooper and Giffin, 1948, Creskoff, Fitz Hugh and Frost, 1948)

The most useful responses are met with in chronic myeloid leukaemia in which condition some two thirds of the number of cases may show improvement and

Apart from the leukaemias, good results from urethane treatment are occasionally met with in other conditions whether related or not, the former including Hodgkin's disease, lymphosarcomatosis (Bock, 1948), mycosis fungoides and multiple myeloma (Berman and his colleagues, 1947), and the latter group carcinoma of the prostate (Huggins, Yu and Jones, 1947, Ajanil and Fuentes Ferrer, 1949), and squamous-cell cancer of the skin (Berman and Axelrod, 1948). Loge and Wayne Rundles (1949) have described 4 cases of multiple myeloma treated with urethane for periods of 8–10 weeks to total doses of 120–290 grammes, with striking benefit observed over 7–13 months Thus fever and skeletal pain subsided in 2–4 weeks, anaemia improved when present, myeloma cells in the marrow decreased in numbers, with morphological changes indicating retarded growth, and serum protein abnormalities and Bence-Jones proteinuria became less pronounced or disappeared No progression occurred in the destructive lesions in bone, but on the other hand there was little evidence of recalcification In prostatic cancer, Huggins, Yu and Jones (1947) believe that urethane may be of some service when the condition has become androgen-independent and widespread

AMINOPTERIN AND RELATED FOLIC ACID ANTAGONISTS IN THE TREATMENT OF ACUTE LEUKAEMIA

Interest in the possible relationship of folic acid to malignant growth was originally stimulated by reports, *none of which have been confirmed, that folic acid itself* and various glutamic acid conjugates exerted inhibitory effects on experimental

remarkable feature was the return of the white-cell count to normal even when leucopenia was present at the outset, and the impression was gained that results were best when therapy could be continued regularly Later experience has con-
... approximately half the number of
... 2 years
... to show

first that Aminopterin and certain related compounds are undoubtedly capable of *inducing folic acid deficiency as shown for instance in rats* (Philips and Thiersch, 1949), by the development of a syndrome comprising loss of weight, hypoplasia of the bone marrow and intestinal lesions with diarrhoea, and secondly that for at least certain experimental tumours folic acid appears to be the only nutrient required, to the extent that tumour growth may be prevented by its absence from
... 1948) On the other hand the anti-folic-
... utic effect
... ua strains

(Burchenal and his colleagues, 1949) Later papers on the clinical application of this substance indicate that in individual series only one in ten cases may show a really

effects are much more serious, and proceed from excessive action of urethane upon

"panmyelophthisis" and aleukia haemorrhagica (Eskola, 1948) have also been described Furthermore there is the impression, which it is of course difficult to prove or disprove, that a proportion of chronic cases terminating with an acute myeloblastic crisis do so under the influence of some abnormal stimulus from urethane

which it induces in chronic leukaemia are never quite as complete as with x-ray irradiation In practice, it is frequently of great service to substitute one method for the other, not necessarily in strict alternation but rather as clinical and other circumstances would appear to dictate It is also necessary to compare urethane with other agents effective in chronic myeloid leukaemia, and especially with benzene and with potassium arsenite in this connexion, Judd and his associates (1948) found that survival time in 3 transfer lines of mouse myeloid leukaemia was significantly lengthened by treatment with potassium arsenite, urethane, x-rays and benzene, in decreasing order of effectiveness In Piney's (1947, 1948 and 1949) opinion benzene, although a useful drug in skilled hands, should never be used until such time as every other resource has failed, when it will, occasionally, still bring about a remission So far as arsenic and urethane are concerned, some would regard them as about equally satisfactory, while a fair body of opinion would on the

each daily) were given in addition to urethane and seemed to result in a significant improvement in liver function (Russell Taylor, 1949) Brief mention may also be made of the recent German interest in choline chloride itself, when employed in large doses, as a possible palliative agent in malignant disease (Becker, 1948)

In chronic lymphatic leukaemia the effects of urethane are similar, but only 1 case in 6 gives responses as satisfactory as those encountered in a considerably

... percentage rises after treatment, although this rise does not bear a clear relationship to prognosis as in myeloid leukaemia Diminution in the size of the spleen and of the lymph nodes is also less constant On the whole, much less benefit

from urethane therapy in aleukaemic, terminal or acute leukaemia

ribosenucleic acid and may persist for many months after the cessation of treatment There is also evidence that Stilbamidine is deposited directly in the myeloma tissue

The renal function should be checked prior to treatment and surveyed at intervals thereafter. When renal function is satisfactory and there is no Bence Jones proteinuria, Stilbamidine may be administered daily, but with proteinuria, and certainly when renal damage is present, injections should be given only every other day *Beneficial effects are said to be much more marked when the patient is maintained on a low-protein diet.* The drug may be given intramuscularly or intravenously In the former case, the dose should be freshly dissolved in 5 millilitres of a 2 per cent solution of procaine hydrochloride, and should be administered through a long needle to prevent deposition in the subcutaneous fat For the intravenous

sweating and giddiness may occur, and may be prevented by the prior administration of $\frac{1}{150}$–$\frac{1}{100}$ grain of atropine sulphate A more serious effect is syncope from a drop in blood pressure Adrenaline may be given again just before the Stilba-
...ent should always be administered slowly Delayed

supplied by *the sensory branches of the trigeminal nerve,* which may develop as long as 2–5 months after the completion of therapy The subjective features include numbness, formication and itching of the affected areas, while the sensation of light touch may be lost but not that of pain, pressure or temperature all these
...of the fifth
...ieved,
...nly to
secure a restricted objective in relief of pain, and as a last therapeutic resort

ALEXANDER HADDOW

(1948) *J Urol* 59 76
er, Habana, 24, 3
1, 899
7
(1948) *Biochem J*, 42, 58
J Lab clin Med, 32, 1394

distinct improvement in haematological findings the remainder developing moderate to severe leucopenia with hypoplasia of the bone marrow

CLINICAL DETAILS

(1949) describes the oral administration of Aminopterin to be as effective as doses given parenterally The results obtained are best in lymphoblastic leukaemia rather less satisfactory in myeloblastic and least satisfactory of all in monocytic leukaemia and appear to be more frequent in children than in adults In chronic leukaemia stem cells granulocytes and immature lymphocytes may decrease in number during treatment mature lymphocytes being relatively unaffected but little or no subjective improvement results and the use of Aminopterin in chronic leukaemia is limited by the early development of toxic phenomena (Meyer and his associates 1949) These include ulcerative stomatitis nausea diarrhoea purpura and aggra

milligrams daily) and 4 amino 9 methyl pteroylglutamic acid (a ninopterin 5–15 milligrams daily) together with other pteroic acids and aminopurines in a still

store

Finally it should be noted that the action of the folic acid anti vitamins is not entirely confined to acute leukaemia and that definite if temporary and inconstant responses have also been reported in mammary cancer cancer of the bladder, neuroblastoma lymphosarcoma and Hodgkin s disease (Wintrobe 1949 Dameshek 1949 Pierce 1949)

STILBAMIDINE AND PENTAMIDINE IN THE PALLIATION OF MYELOMA

The use of Stilbamidine (4 4 diamidinostilbene) and Pentamidine (4 4

stances may produce complete or partial relief of bone pain in some 80 per cent of cases the course of the disease itself is only halted temporarily A remarkable feature of this specific effect is the appearance of a characteristic alteration in the bone marrow namely the development of basophilic precipitates in the cytoplasm of the myeloma cells these inclusion bodies contain considerable quantities of

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Burchenal, J R , Kushida, M N , Johnston, S F , and Williams, B S (1949) *Cancer*, 2, 113
Claudy, W D (1949) *Med Ann Distr Columbia*, 18 185
Cornell, V H , and Blauw, A S (1949) *Amer J Path* , 25, 233
Council on Pharmacy and Chemistry of the American Medical Association (1948) *J Amer med Ass* , 137, 699
Craver, L F (1948) *Bull N Y Acad Med* , 24, 3

4-hourly increases the plasma level of penicillin about 5 times (Crosson and his colleagues, 1947)

Streptomycin

A limited number of organisms which are highly resistant to penicillin respond to streptomycin in doses of 1 gramme 3 times daily, these include resistant strains of streptococci and *Haemophilus influenzae* (Priest and McGee, 1946)

TREATMENT OF COMPLICATIONS

Cardiac complications —Complications, such as changes of rhythm, which are rare, and heart failure, which is common, should be treated by standard methods

Inflammatory nodes —Inflammatory nodes never require incision except possibly in staphylococcal cases, because they are non suppurative and disappear spontaneously

Embolism —Peripheral arterial emboli may cause considerable alarm The great majority, however, may be safely left alone Embolectomy is required only when the vitality of the limb is still threatened 3–4 hours after the onset During this waiting period every ... ns of heat, morphine, ½ ... ½ grain intravenously, ... yl *ammonium bromide, 200–300 milligrams intravenously, or other vasodilators.* Except in elderly atherosclerotic or diabetic subjects, embolectomy is practically never required in the upper extremities, surgical help may be needed, however, when an embolus lodges at the bifurcation of the aorta, in the common or external iliac artery or in the femoral artery above the origin of its deep branch It is by no means uncommon for a dangerously high embolus to move distally into safety within a comparatively short time

Mesenteric embolism should also be left alone Recovery is by no means rare with proper medical treatment, whereas the surgical mortality rate is about 90 per cent

Cerebral, coronary or other visceral embolism giving rise to stroke, cardiac infarction or visceral infarcts respectively, requires the usual management for such conditions

... confused with heart failure or with ... is important because it may save ... fortunately, diffuse nephritis is frequently fatal

Haemorrhage —Fatal haemorrhage is usually cerebral or subarachnoid Haemorrhages in other situations, however, may be treated with transfusion but the jugular venous pressure should be watched carefully and the transfusion ... of blood or fluid is, of ... failure ... illary resistance ... es a day, crude

Patey, D H, and Dyson, W H (1948) *Brit. J Cancer*, 2, 12.

Proc R. Soc Med, 41, 45

TREATMENT

Preventive

It is not possible here to enter into the prophylactic treatment of psychiatric

fear into the child, tends to bury the real anxiety, and encourages the parents to

effort should be made to ensure a favourable environment for them· it is better to maintain a conscientious and hardworking citizen in a soft job, than to support a broken man in hospital

Remedial

Patients with psychosomatic symptoms of the kind described above tend to attribute them to heart disease, and such patients are never satisfied without a thorough physical examination, if necessary supported by an x-ray examination and an electrocardiogram The first round is won when the patient is convinced that his heart is normal Reassurance alone is valueless, and it must be followed by a convincing explanation of the cause of the symptoms It is not difficult to persuade a patient that *hurried breathing, palpitations, clammy palms,* weakness of the knees trembling and similar symptoms may be provoked by conscious fear, and it is

carried If the patient is co-operative and is prepared to talk freely, a multiplicity of

than be offered Any worry that is discussed willingly and easily

is that are accom-

the case, these do

not come *glibly*

Frank discussion of the painful causes of an anxiety state usually relieves tension and itself brings some improvement, but this is short-lived unless more important objectives are gained, the patient must be convinced of the psychiatric nature of his illness and of the innocence of his physical symptoms The parasitic growth of secondary anxieties, such as fear of effort, must be exposed and *eradicated, if* the major conflict cannot be resolved, a practical way of coming to better terms with

vitamin P in the form of orange or lemon juice, and perhaps rutin, 40 milligrams 3 times a day

Aneurysms—Mycotic aneurysms may require surgical repair or ligation of the offending vessel

RESULTS OF TREATMENT

The infection may be controlled in at least 90 per cent of cases by means of penicillin, nevertheless, 35 per cent of patients still die, mostly from heart failure (Christie, 1948) A minority of deaths are due to uraemia (6 per cent), to emboli (11 per cent), or to haemorrhage (8 per cent) Although anticoagulants may prevent some of the emboli, they increase the incidence of fatal haemorrhage and for this reason are not recommended Christie found that the most important factors influencing the outcome were the presence and degree of heart failure, the duration of the infection prior to treatment, and the nutritional state of the patient Subsidiary therapeutic measures should therefore include a sense of urgency with regard to commencing penicillin, blood transfusion to combat anaemia, and a highly nutritious diet with added vitamins

AFTER CARE

The majority of relapses occur within a month of discontinuing penicillin During this period, therefore, patients should remain under close medical supervision, preferably at a convalescent home Subsequently they should be examined at least once a fortnight for the next 3 months, and then at less frequent intervals

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CARDIOVASCULAR DISTURBANCES ASSOCIATED WITH PSYCHIATRIC STATES

INTRODUCTION

The physical syndrome first properly described by DaCosta in 1871, consisting o[illegible] breathlessness, palpitations, fatigue, left inframammary pain, headache and dizz[illegible] ness, is psychosomatic in nature, and is nearly always due to an anxiety state (Woo[illegible] 1941) Though it has proved a special problem in times of war, it is hardly less [illegible] during peace Physical signs include nervousness, cold extremities, clammy han[illegible] [illegible] tachycardia, raised casual blood pressure, frequent sig[illegible] [illegible] hold the breath for more than 20 secon[illegible] [illegible] probably hereditary in nat[illegible] [illegible] symptoms mentioned comm[illegible] [illegible] in no sense limited to exer[illegible] [illegible] emotional turmoil.

but occur under any [illegible]

pulmonary stenosis All cases of congenital heart disease in which there are abnormal communications or stenosed orifices, except atrial septal defect, should be protected as far as possible from bacterial endocarditis All infections which are

pressure may occur as a successful compensatory mechanism to maintain an adequate cardiac output for many years before the heart is overloaded If this point is not appreciated, patients with simple pulmonary stenosis might be treated with rest in bed and with digitalis at a time when they could be leading a relatively active life in safety Nevertheless, this rise in venous pressure is a clear warning of a serious prognosis

Congestive failure in congenital heart disease should be treated by the usual methods, but venesection is not advised in cases with central cyanosis

CONDITIONS AMENABLE TO SURGICAL TREATMENT

Patent Ductus Arteriosus

Surgical ligation of the ductus or excision between ligatures was introduced by Gross and Hubbard (1939) The operation is indicated in all cases in which the

to cause cardiac enlargement On the other hand, the frequency of bacterial endocarditis (30 per cent) in untreated cases suggests that ligation should be performed as a routine The argument that the danger of bacterial endocarditis has been minimized by penicillin is not strong, because results with penicillin alone are by no means excellent, not only with regard to mortality but also in respect of complications, particularly irreparable damage to the heart valves

The best age of the patient for operation is ten years It is obviously advisable to cure the condition as soon as possible to avoid unnecessary risk, but there is reason to believe that the ductus may close spontaneously up to this age Every effort must be made to ensure that a patent ductus is not a beneficial concomitant of a more serious lesion, such as Fallot's tetralogy Particular care must also be taken not to overlook associated coarctation of the aorta

Fallot's Tetralogy

As a result of Taussig's observation that infants with Fallot's tetralogy often deteriorate rapidly when the ductus closes, and that others with a persistent patent ductus remain relatively well (Taussig, 1948), she and Blalock devised the anastomotic operation which has proved so successful One or other subclavian artery is anastomosed to the homolateral pulmonary artery, thus creating an artificial ductus

The most important indications for such an operation include an arterial oxygen saturation below 66 per cent, a low pulmonary blood pressure and a single second

Graduated exercises play no part in the treatment of DaCosta's syndrome, and they should be abandoned, for they draw particular attention to the patient's physical disability, the very aspect of the syndrome that is best overlooked.

Wood, P. H (1941). "Differential diagnosis of DaCosta's syndrome." *Proc. R Soc. Med*, 34, 543.

CONGENITAL HEART DISEASE

Recent advances in surgery have altered the prospects of several types of congenital heart disease. It has become necessary, therefore to make an accurate

GENERAL PRINCIPLES

Cases of congenital heart disease may be classed broadly as acyanotic or cyanotic, in the former group are included those defects which may result in late, terminal, or transient cyanosis

Relatively common acyanotic anomalies include dextrocardia, coarctation of the aorta, aortic and sub-aortic stenosis, *maladie de Roger*, simple pulmonary stenosis,

patent ductus) and cor triloculare with one auricle or one ventricle.

CONDITIONS UNSUITABLE FOR SURGICAL TREATMENT

The management of cases unsuitable for operation depends chiefly upon the functional state of the heart Of the acyanotic forms, *maladie de Roger* causes little or no disability and requires no limitation of effort Sub-aortic stenosis is also a relatively mild lesion, and patients with this anomaly should be encouraged, as a rule, to do as they like Aortic valvular stenosis, simple pulmonary stenosis and atrial septal defect are more serious Patients with these conditions should be trained for a sedentary occupation, should be forbidden competitive effort, and should be advised to avoid any exertion which causes symptoms. Most patients

wisely trained.

Special precautions should be taken against pulmonary tuberculosis in those conditions in which the blood flow to the lungs is reduced, for example, in

of the majority of young adults or adolescents with this anomaly, surgical repair, as described by Crafoord and Nylin (1945), should be advised or offered in most cases The physiological results of a technically successful operation are remarkably good the blood pressure returns to normal, cardiac enlargement diminishes and it may be assumed that the risks of cerebral haemorrhage, aortic rupture and bacterial endocarditis are considerably reduced The best results seem to be obtained *in young children between the ages of 3 and 10 years*

Brock, R C (1948) *Brit med J*, 1, 1121

HEART FAILURE

DEFINITIONS

Congestive heart failure may be defined in general terms as a state in which the heart is unable to meet its resting obligations Physiologically it is "overloaded (Starling 1918) any further rise of venous pressure results in a fall in cardiac out put, if the venous pressure is lowered, the cardiac output rises (McMichael and Sharpey Schafer, 1944)

Left ventricular failure may be defined as a state of pulmonary congestion initiated by transient discrepancy between left and right ventricular outputs, resulting from inability of the left ventricle to maintain the same output as the right without an abnormal rise of left auricular pressure

PHYSIOLOGICAL CONSIDERATIONS

Elevation of the systemic venous pressure, distension of the liver and dependent oedema are the chief signs of congestive heart failure The cause of the rise in venous pressure is unknown, but it is believed to be due partly to an increase in venomotor tone (McMichael, 1947), partly to an increase in blood volume (Warren and Stead, 1944) and partly, perhaps, to "back pressure" *Hepatic distension is* due to the rise in right auricular pressure The cause of oedema is not understood It may be encouraged by an increased hydrostatic pressure at the venous end of the *capillaries, but is probably more directly attributable to sodium retention resulting* from diminution of the renal blood flow (Merrill, 1946)

... to reflexes set up by pulmonary ... tributed to ... -d, for ex ample, by anything which elevates the venous pressure and so causes an increase ... due to peri ... he skin The ... conditions, such as anaemia, thyrotoxicosis, arteriovenous aneurysm, pulmonary heart disease secondary to emphysema, and beri beri elevation of the venous pressure and oedema may be found when the cardiac output is high

[illegible]

Blalock has performed over 500 of these anastomoses, with a total mortality rate of 17 per cent The death rate in infants under 3 years of age, however, is about 25 per cent, and a number of practically hopeless cases were included in the series [illegible]

[illegible]

tolerance, appearance, growth and mental development is beyond dispute.

Pulmonary valvulotomy

In certain cases of Fallot's tetralogy, pulmonary stenosis is valvular rather than subvalvular; the pulmonary blood flow may then be improved by means of pulmonary valvulotomy (Brock, 1948) The operation has proved more hazardous than has Blalock's so far, but further experience and technical improvements may alter this.

Pulmonary valvulotomy may also be offered to cases of pulmonary valvular stenosis associated with atrial septal defect In this anomaly there is a considerable shunt from right to left auricle, the right auricular pressure being raised and the left lowered on account of the pulmonary stenosis The operation should not only improve the pulmonary blood flow directly, but should also result in reversal of the inter-atrial shunt.

OTHER FORMS OF CONGENITAL HEART DISEASE

Other forms of congenital heart disease with veno-arterial shunt may or may not [illegible] criteria [illegible] the sub- [illegible]

Congenital tricuspid incompetence or atresia, with associated atrial septal defect [illegible]

The Eisenmenger complex does not present the required conditions, nor do three-chambered hearts

COARCTATION OF THE AORTA

The majority of patients with the adult form of coarctation of the aorta die between the ages of 20 and 40 years as a result of cerebral haemorrhage, rupture of the aorta, bacterial endocarditis or congestive heart failure. Despite the well-being

TABLE II—*cont*

Allowed	Milligrams per ounce	Not allowed	Milligrams per ounce
Fruit			
Apples	0 8	Currants (dried)	5 5
Dates	1 4	Figs (dried)	24 6
Grapes	0 5	Melons	5 5
Oranges	0 8	Passion fruit	8 1
Pears	0 7	Sultanas	15 0
Plums	0 5	Stewed dried apricots	6 7
Prunes	1 3		
Vegetables			
Beans (French)	1 0	Carrots	14 2
Cabbage	2 3	Beetroot	18 2
Leeks	1 8	Celery (raw)	38 9
Parsnips	1 2	Radishes	16 8
Peas	trace	Spinach	34 9
Potatoes	1 0	Watercress	17 0
Swedes	4 1		
Sprouts	2 2		
Tomatoes	0 8		
Sundries			
Coffee	trace	Blended chocolate	(78)
Tea	trace	Plain chocolate	(41)
Beer	3 8	Mincemeat	(59)
Jam	4 5	Syrup	76 6
Marmalade	5 2	Treacle	27 2
Honey	2 0	Bourn Vita	102 0
Ice-cream	18 2	Bovril	(1580)
		Cocoa powder	(185)
		Horlicks malted milk	196
		Virol	(106)

(Figures in parentheses indicate foods with added salt)

DRUGS

Digitalis

The value of digitalis and its limitations were first described by Withering (1785) ... which he recommended

recognized by Mackenzie (1913), and Lewis (1933) ... had little value in cases with normal rhythm unless it slowed the heart rate In recent years, however, it has been proved conclusively that digitalis benefits all forms of congestive heart failure and left ventricular failure as defined above, whatever the rhythm (Wood, 1940), whether the drug has a primary venous pressure lowering action (McMichael and Sharpey Schafer, 1944) or not (Wood and Parlett, ...

e more

TREATMENT OF THE HEART FAILURE

The object of treatment is to reduce the work of the heart, to restore its health and strength and to correct the adverse consequences of its failure.

Rest

one third of the time, diastolic rest whenever , anxiety and tachycardia

t it need only achieve this, d of 3 weeks lmonary em- permitted to sit in an armchair for an hour encouraged to feed and wash himself, in other words, absolute rest is not required except when the demands it as in diphtheritic carditis, acute

its

en

ne,

¼–½ grain 3 times

Posture

orthopnoeic or otherwise, should

cause it elevates the thighs, the calves The only type of heart failure which may require horizontal position is that due to diphtheritic carditis, when associated circulatory collapse may cause syncope or sudden death in the erect posture.

Diet

The cardiac output rises after the ingestion of food, and the heavier the meal the higher the rise Small, light feeds are therefore advised, and cases of acute failure

must be understood however that the fall in venous pressure may be no greater in such patients than in those with normal rhythm in which there may be no slowing

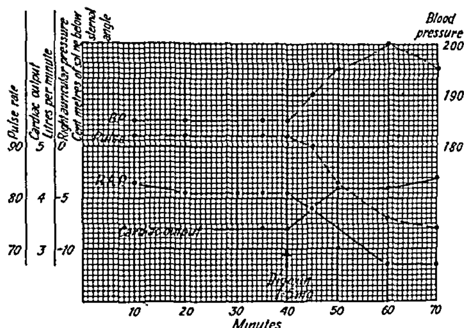


FIG 5 —Graph showing the effect of d gitalis in a case of hypertensive heart failure The venous pressure and pulse rate fall the cardiac output and blood pressure rise

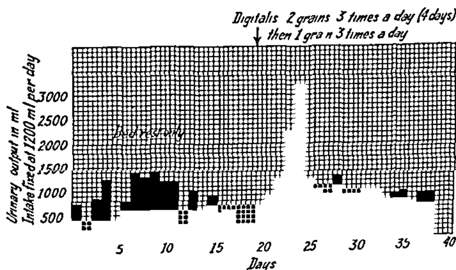


FIG 6 —Chart illustrat ng the diuret c effect of digital s in a case of heart fa lure with normal rhythm.

tion, the good effect of digitalis may be partly due to slowing of the heart rate It

TABLE III
SUGGESTED 2,000-CALORIE DIET

Meal	C	P	F	Sodium (milligrams)	
				Highest	Lowest
Breakfast					
4 oz porridge (unsalted)	9 2	1 6	1 2	9 5	—
or					
½ oz. Shredded Wheat					2 35
2 oz unsalted bread	32 6	4 8	0 6	2 8	2 8
1 egg—fresh or dried	—	6 0	6 0	76 8	76 8
½ oz marmalade, jam or honey	9 85	—	—	2 6	1 0
Lunch					
2 oz allowed meat or 3 oz. allowed fish	—	14 2	11 6	68 0	18 2
4 oz potato	22 4	1 6	—	46 0	4 0
Average serving of allowed vegetables	3 0	—	—	24 0	trace
Average serving of allowed fruit	10 0	—	—	10 4	1 2
Milk pudding (5 oz milk)	30 5	6 5	13 0	70 0	70 0
Tea					
2 oz. unsalted bread	32 6	4 8	0 6	2 8	2 8
½ oz. jam, honey or marmalade	9 85	—	—	2 6	1 0
1 slice allowed cake	15 0	2 0	5 7	29 0	—
or					
3 sweet biscuits (unsalted)					3 5
Dinner					
2 oz. allowed meat or 3 oz allowed fish	—	14 2	11 6	68 0	18 2
4 oz potato	22 4	1 6	—	46 0	4 0
Serving of allowed vegetables or salad	3 0	—	—	24 0	trace
Average serving of allowed fruit	10 0	—	—	10 4	1 2
1 oz. unsalted bread	16 3	2 4	0 3	1 4	1 4
¾ oz unsalted cheese (home-made)	—	6 0	6 0	6 75	6 75
Daily					
¾ oz. salt free butter or salt free margarine	—	—	18 0	8 85	8 85
½ oz sugar	15 0	—	—	0 9	0 05
4 oz milk (apart from milk pudding)	5 6	3 6	4 4	56 8	56 8
Totals	247 3	69 3	79 0	567 6	280 9
			(1 975 calories)		

and hence of the venous pressure Again, it is as well to remember that there may be considerable fluid retention in the tissues before pitting oedema is demonstrable There is no limit to the maximal number of injections which may be given safely Chronic cases with a persistent tendency to oedema have been given mersalyl twice weekly for years without ill effect

No other diuretics can be compared with the mercurials in efficiency, but the

is far more soluble than theobromine

Theophylline-ethylenediamine

Theophylline-ethylenediamine (Euphyllin, Cardophylin, aminophylline) is of

thus an excellent remedy for paroxysmal cardiac dyspnoea and for acute pulmonary oedema Its effect, however, is transient, and it is therefore of less value in the treatment of congestive heart failure

The drug may be given by mouth, however, in doses of 0 2–0 3 gramme 4 hourly Larger doses may be tried but these usually cause epigastric pain and nausea, and

may be obtained in

and is therefore of particular value in ischaemic heart failure Indeed, it is wise to use it in preference to digitalis in such cases owing to the risk of ventricular fibrillation with a small overdose of the latter drug

Aminophylline is also an antispasmodic, and is therefore specially indicated when it is uncertain whether attacks of dyspnoea are due to left ventricular failure or to bronchial asthma, or when paroxysmal cardiac dyspnoea is complicated by bronchial spasm

Finally, theophylline-ethylenediamine is a specific remedy for Cheyne-Stokes

SPECIAL MEASURES

Venesection

There is no more effective way of reducing the blood volume and the venous pressure than by venesection It is a valuable therapeutic agent in any form of congestive heart failure or left ventricular failure as previously defined, and is only contra-indicated when there is anaemia, compensatory polycythaemia or severe anoxia Approximately 600 millilitres of blood should be removed In recent years, venesection has rather fallen into abeyance, good results being achieved by other means, but it should be practised more frequently in addition to the other methods

Methods of administering digitalis are described on page 200 It is uni to produce symptoms of intoxication to obtain a satisfactory fall in pressure, indeed, an adequate dose to achieve this result may be less th required to control the ventricular rate in cases of auricular fibrillation digitalis preparation may be used Strophanthin, 1 0 milligram intraveno very effective (McMichael, 1948)

It is unnecessary to continue with a maintenance dose of digitalis for long congestive failure has been overcome It is better to determine whether the pa can hold his own without its support If failure then recurs however, the u maintenance dose should be given (*see* page 202)

The signs and symptoms of intoxication are described on page 202

Mercurial diuretics

Salyrgan, Neptal, Novurit mersalyl, and mercurophylline are similar compound, which have been developed from the original more toxic mercurial diuretic, Novasurol They contain about 40 per cent of mercury Ampoules for injection contain 10 per cent of the drug and 5 per cent of theophylline, tablets for oral use contain 0 08 gramme of the drug and 0 04 gramme of theophylline, suppositories contain 0 4 gramme of the drug and 0 2 gramme of theophylline.

The diuretic action of these compounds is not understood They are said to act on the renal tubules Diuresis commences within an hour or two and continues for about 24 hours The venous pressure falls in proportion to the diuresis and is believed to depend on diminution of the blood volume This fall in venous pressure has the usual beneficial effect in cases of congestive heart failure, and explains the value of mersalyl in preventing attacks of paroxysmal cardiac dyspnoea

The dose of all the mercurial diuretics is 2 millilitres intramuscularly twice weekly The intravenous route is not recommended because it has been followed occasionally by sudden death, although such fatalities are admittedly very rare Two tablets may be given by mouth 3 times a day for 2 or 3 days each week but are apt to cause dyspepsia and inadequate diuresis A rectal suppository may be given once or twice a week, but usually causes severe burning pain There is nothing to gain and much to lose by using the oral or rectal routes instead of the intramuscular route It is customary to support the action of the mercurial diuretics by the administration of ammonium chloride, 15–30 grains 3 times a day, for 2 days, commencing the day before the injection Ammonium Chloride Emplets, 7½ grains (0 5 gramme) in each, have an enteric coating, and the usual dose is 2 Emplets after food

Toxic reactions from intramuscular mersalyl are rare Patients sometimes complain of headache, catarrh, digestive disturbance and depression and may say they feel as if they have a mild attack of influenza, but this is unusual Toxic nephrosis has been described occasionally in cases that have had full doses for prolonged periods. It is characterized by degeneration and calcification of the tubules The only contra indications to the drug are acute nephritis and hypersensitivity

Finally, it must be pointed out that congestive heart failure that does not respond to rest and to digitalis should be treated with mercurial diuretics, whether there is oedema or not, for if the venous pressure is high, the blood volume is usually increased and, as stated previously, diuresis results in a reduction of blood volume

Vitamins

Aneurine (vitamin B_1), in doses of 50–100 milligrams daily, may be given with advantage to alcoholic subjects, and to those whose *previous diet suggests* a possibility of associated B_1 deficiency.

Vitamin C has been advocated as a diuretic, but is rarely helpful except in cases of *rheumatic fever, bacterial endocarditis,* or other subacute infections Ascorbic acid should be given in doses of 50–100 milligrams daily.

TREATMENT OF THE UNDERLYING HEART DISEASE

In treating patients with congestive heart failure, every effort should be made to establish the aetiology as soon as possible, for specific treatment may be available Thus patent ductus arteriosus, Fallot's tetralogy, coarctation of the aorta, and arteriovenous aneurysm may be cured by surgical repair or may be relieved by other surgical measures *Thyrotoxic heart failure may be cured promptly by means*

[illegible] be managed by means of antisyphilitic remedies but the [illegible]

consideration Transfusion occasionally causes pulmonary oedema in such cases In severe pernicious or iron-deficiency anaemia it is therefore wiser not to transfuse but to give the appropriate haemopoietic agent

TREATMENT OF PAROXYSMAL CARDIAC DYSPNOEA

As previously mentioned, paroxysmal cardiac dyspnoea may be prevented by all the remedies used for the treatment of congestive heart failure Acute attacks, however, demand urgent therapy The object is to lower the venous pressure as quickly [illegible] pulmonary congestion The measures employed to [illegible]

be given intravenously with advantage It should be [illegible] litre of saline solution or sterile water and injected slowly over a period of not less than a minute *If it is known that the patient has not had digitalis within* the previous month, strophanthin 0 5–1 0 milligram, or digoxin 0 5–1 0 milligram, *may be injected intravenously In urgent* cases larger doses may be necessary, namely, strophanthin, 1 25 milligrams, or digoxin 1 5 milligrams *It must be* remembered, however, that both may have a conspicuous pressor effect, which may have disastrous consequences if their beneficial action on the myocardium does not outweigh them Digitalis is perhaps better employed to consolidate the improvement won by other means and to prevent further attacks Oxygen is of little value unless there is pulmonary oedema Adrenaline is not advised, for it may cause paroxysmal ventricular tachycardia or ventricular fibrillation in cases of ischaemic, hypertensive or aortic valve disease in which the coronary circulation may be inadequate, and because it is little better than aminophylline for relieving

Use of Southey's tubes

Acupuncture

away. It is helpful to swab down the legs with a warm citrate solution from time to time Due asepsis must be maintained

These last two procedures are not merely cosmetic or palliative operations, the loss of fluid from the tissues results in diminution of the blood volume and therefore of the venous pressure An increase in cardiac output results, the renal blood flow is improved and the whole situation may change for the better. Moreover, the fluid lost contains very little protein, not necessarily more than is found in the urine (in nephrosis it is considerably less).

Artificial myxoedema

Should the patient remain bedridden despite all these procedures, an attempt may be made to reduce the circulatory demands by lowering the oxygen consumption of the body by means of total ablation of the thyroid gland or by thiouracil The latter is preferable because it can be abandoned if unsuccessful, and because it avoids the

relatively well and resume a placid existence at home The best results are obtained in patients with anoxic pulmonary heart disease or with ischaemic heart disease.

Oxygen

Oxygen is of no value in congestive heart failure except in cases of pulmonary heart disease secondary to emphysema and in cases of congenital heart failure with

may be of some benefit when there is pulmonary oedema

High protein diet

In chronic cases of cardiac oedema the blood proteins may fall as low as 5 grammes per cent. In such circumstances a high-protein diet may initiate diuresis

all of these conditions, treatment for the primary disease is more important than cardiological treatment

THYROTOXICOSIS

The treatment of thyrotoxicosis is considered fully elsewhere *(see page 659)*

ANOXIC PULMONARY HEART DISEASE

Anoxic pulmonary heart disease is considered in detail in another section *(see page 191)*

ANAEMIA

Heart failure in anaemia responds rapidly to improvement in the haemoglobin level The most important consideration is to avoid overloading the heart as a result of transfusion (Sharpey-Schafer, 1944) When the latter is deemed vital, con centrated red cells are preferable to whole blood, and they should be given very [illegible] intravenously, tetraethylammonium bromide, 200 milligrams intravenously, and trinitrin, $\frac{1}{100}$ grain, may be given if there is evidence of acute pulmonary oedema

The perilous state of the heart in severe pernicious anaemia is sufficient reason alone for treating such cases with complete rest in bed until the haemoglobin value is over 40 per cent The presence of angina pectoris is a less important reason

ARTERIOVENOUS ANEURYSM

Arteriovenous aneurysm may be congenital or acquired and may occur in almost any situation, particularly in the head and neck, limbs or lungs

Congenital Cirsoid Aneurysm

Cirsoid aneurysm consists of an angiomatous tumour in which the arteries and veins are in direct communication

The cerebral type may be responsible for subarachnoid haemorrhage ophthalmo-plegic migraine, or epilepsy *The diagnosis is suggested by the presence of a* [illegible] heard through the eyeball or through the skull on [illegible] pre-liminary tests show that such interference with the cerebral circulation will not cause serious disturbance of function

Cirsoid aneurysm *in a limb does not differ materially from acquired traumatic* arteriovenous aneurysm, but such lesions cannot be *repaired surgically* Treat ment consists of ligation of the major artery and vein in communication with the aneurysm, both above and below the lesion, if the circulation of the extremity is not thus imperilled, deep x ray therapy may be tried first

Congenital Pulmonary Arteriovenous Aneurysm

This type of aneurysm causes considerable shunting of venous blood into the *arterial circulation and results in cyanosis,* clubbing of the fingers and poly cythaemia, the heart itself being normal The lesion may be recognized by the presence

bronchial spasm There is no place for atropine or strychnine in the treatment of paroxysmal cardiac dyspnoea, for neither is of therapeutic benefit Coramine and other respiratory stimulants are contra indicated, for the object is to depress respiration

We acknowledge with thanks the help of Miss J H Russell of the London Clinic in compiling the Sodium-restricted Diet Tables

Lewis T (1933) *Diseases of the Heart* 1st ed London, Macmillan
Mackenzie J (1913) *Diseases of the Heart* 3rd ed London, Oxford University Press
McCance, R A , and Widdowson, E M (1946) ' The Chemical Composition of Foods"

HYPERKINETIC CIRCULATORY STATES

High resting cardiac outputs are encountered in thyrotoxicosis, anoxic pulmon-

tremities, and tumultuous action of the heart In anaemia, thyrotoxicosis, and in anoxic pulmonary heart disease, the high cardiac output is clearly compensatory and benefits the organism by increasing the oxygen supply to the tissues, but in the other conditions mentioned, nothing is gained The exact mechanism whereby the output is increased by means of tachycardia or by elevation of the venous pressure is not known, but it seems to be in some way related to vasodilatation in certain territories, such as those of skin and muscle Physiologically, a hyperkinetic circulation occurs with fever, exercise and pregnancy

The heart may become overburdened as the result of the excessive work

many of the conditions mentioned, oedema may occur in either state, but hepatic distension is more likely to be encountered when there is true heart failure When the high cardiac output is physiological and beneficial, no cardiological treatment is required, indeed, it may be harmful On the other hand, when the heart is overloaded, the ordinary treatment for congestive failure is necessary On the whole, in

slight symptoms in grade IIa, and those with severe symptoms in grade IIb whi
cases with auricular fibrillation or congestive heart failure are put in grade I
(Pardee, 1934) It is generally agreed that no action need be taken in regard t
women in grade I, nor is it necessary to limit the size of their families provided the

difficulty arises in relation to women in grade II While they remain in grade IIa
pregnancy is well tolerated, such patients should be allowed to have 2 or 3 childre
and they may be taken to term in safety, but unfortunately, as pregnancy advances
they are apt to deteriorate and to enter grade IIb Patients in grade IIb at the begin
ning of pregnancy are almost sure to develop auricular fibrillation or congestiv
heart failure later on, and pregnancy is best terminated early; for this reason the
should be dissuaded from having children But if they are so graded late in preg
nancy, every effort should be made to carry them to term or at least to continu

latter months of pregnancy, rest in bed may be necessary, either continually or to
several hours each day, according to the severity of the symptoms

In favourable cases the mortality rate amongst both mothers and infants is no
higher than in normal controls, but in unfavourable cases the maternal mortality
rate is about 18–32 per cent, and is 3–4 times as high as the mortality in non
pregnant controls with heart disease of the same severity, while the infant mortality
is 30–50 per cent (Hamilton 1947) The cause of death is usually congestive heart
failure or pulmonary embolism, both of which may occur during the puerperium as
well as during pregnancy

influence on the uterus or on the foetus

SPECIAL MANAGEMENT IN RELATIONSHIP TO THE AETIOLOGICAL TYPE OF HEART DISEASE PRESENT

Congenital heart disease—As a rule, congenital heart disease in women who have conceived is mild and includes the relatively common anomalies compatible with a fairly active adult life namely patent ductus arteriosus *maladie de Roger*, coarctation of the aorta, and atrial septal defect

On the whole, patent ductus arteriosus and *maladie de Roger* cause little trouble but if a large patent ductus is discovered early in pregnancy, it is probably best ligated at once (*see* page 162) There is some risk of rupture of the aorta in cases of coarctation during pregnancy although the majority come to no harm The high
... associated with this anomaly may be mistaken for toxaemia of

of a machinery murmur in an unusual situation by the fluoroscopic demonstration of a pulsating tumour in the lung, or by means of angiocardiography More than one aneurysm may be present, and more than one lobe of the lung may be involved

Single or multiple lobectomy or pneumonectomy offers an excellent chance of a permanent cure in most cases provided that the lesions are not too many or too widespread (Burchell and Clagett, 1947)

Acquired Arteriovenous Aneurysm

Acquired arteriovenous aneurysm is commonly due to penetrating injuries, particularly gunshot wounds, but on rare occasions it may be mycotic syphilitic, or even artificial The lesion is usually connected with one of the carotid, brachial or [illegible]

The best treatment is the repair of the artery by means of lateral suture, so that the natural circulation to the brain or limb is restored Ligation of the artery and vein leading to the aneurysm is less satisfactory and may result in serious distal ischaemia, although it is an effective method of correcting the general circulatory disturbance, before such a measure is undertaken, preliminary tests should be carried out in order to assess the likely local effects of ligation Small arteriovenous aneurysms which do not affect the general circulation may be left alone, in the hope that they may become obliterated spontaneously

BERI BERI

The treatment of beri beri is fully considered later From the cardiac point of view there is little to add, except to stress the fact that heart failure may develop remarkably suddenly and may prove rapidly fatal unless treated in time with aneurine (50–100 milligrams intravenously) Such fulminating cases are rare in Western civilized communities, but they have been reported occasionally (Wood, 1939) As a rule, cases are complicated by other forms of heart disease, deficiency of [illegible]

ventricular failure, is seen very infrequently

THE HEART IN PREGNANCY

Effect of Pregnancy on the Circulation

The hyperkinetic circulation associated with pregnancy, which is due to the increased metabolism, raised blood volume, and probably to a uterine arteriovenous shunt, is easily tolerated by a normal heart, but it may have disastrous consequences in patients with congenital, rheumatic, thyrotoxic, and hypertensive heart disease

General Management

The classification adopted by the New York Heart Association in 1924, whereby cases of heart disease of any aetiology are divided into four grades, has proved of practical value Patients without any symptoms are placed in grade I, those with

advised, for serious trouble may be encountered and the chances of a live baby are only about 33 per cent (Browne, 1947)

If pregnancy is already advanced when essential hypertension is discovered the effect of rest in bed, of sedatives and of a low sodium diet should be ascertained If the basal blood pressure drops to 160/100 or below, the outlook is favourable, similar treatment being instituted from time to time when necessary; but if the pressure does not fall satisfactorily, pregnancy may have to be terminated

Browne F J (1947) *Brit med J*, 2 283

INACTIVE RHEUMATIC HEART DISEASE

Rheumatic carditis signifies active lesions in the heart, rheumatic heart disease refers to the results of such lesions when activity has subsided and the processes of repair have been completed The convention is necessarily based on arbitrary criteria and is larg [illegible] however provided it is und [illegible] sub-clinical form for [illegible] ides stenosis or incompetence of the mitral, aortic or tricuspid valve (very rarely the pulmonary valve), adherent pericardium, and myocardial fibrosis

TREATMENT

No specific treatment is available but the rapid advance of cardiac surgery [illegible] the near [illegible] manage [illegible] tive effort [illegible] ned Forces [illegible] possible to generalize further

When there are no symptoms no other restrictions are necessary, but special precautions should be taken to avoid infection fatigue and exposure to the elements, not only because of the danger of recurrent rheumatism, but also because

Atrial septal defect presents a more difficult problem for heart failure is likely to develop spontaneously during the third or fourth decade and is certainly hastened

the

that

On the other hand it must be admitted that there have been many instances of women with atrial septal defect with or without associated mitral stenosis who have had large families Management should be influenced by the size of the shunt This is easily determined by means of cardiac catheterization or it may be estimated by the radiological appearances of the heart When large pregnancy should be avoided but if the patient has already conceived she may be taken to term with due care or the pregnancy may be terminated if there is evidence of impending failure

Pulmonary stenosis whether pure or as part of Fallot s tetralogy is usually regarded as a direct bar to pregnancy

responsible for 90–95 per cent of all cases of heart disease in pregnancy The type of valve lesion does not influence the mortality rate or the management of these patients (Bunim and Rubricius 1948) but rheumatic activity is serious for there is no knowing what course it is likely to take and an exacerbation of carditis in late pregnancy may have dire consequences Such cases are probably best terminated as soon as the state of the heart permits but as a rule sterilization should be deferred because it is impossible to estimate the degree of permanent damage in the presence of activity

Thyrotoxicosis —There are several aspects to the problem of thyrotoxicosis in pregnancy (1) There can be no doubt that pregnancy itself may be an important precipitating or aggravating cause of thyrotoxicosis for it stimulates thyroid activity probably *via* the pituitary gland partial thyroidectomy is not therefore advised during pregnancy for results are rarely good when the operation is per formed

some danger of goitre in the foetus

The wise course is to use thiouracil in minimal doses comb ned with increased rest sedatives and an adequate supply of crude vitam n B Sufficient effect can usually be obtained with 100 milligrams of methylthiouracil or propylthiouracil daily (Himsworth 1948) such doses being unlikely to cause foetal goitre

Subsequent conception should be deferred for at least a year after thyrotoxicosis appears to be cured

Hypertension —About 25 per cent of cases of high blood pressure in pregnancy are examples of pre-existing chronic hypertension usually essential and they should

ISCHAEMIC HEART DISEASE

ANGINA PECTORIS

According to custom, angina pectoris may be defined as cardiac pain due to *myocardial ischaemia*. It is commonly the result of occlusive coronary atherosclerosis, spirochaetal aortitis with stenosis of the coronary ostia (invariably with aortic incompetence), aortic stenosis, or gross anaemia (usually pernicious), rarer causes include coronary embolism, Buerger's disease, other forms of coronary angiitis, congenital anomalies of the coronary circulation, and extreme rheumatic aortic incompetence, contributory factors include severe hypertension, obesity, diabetes mellitus, paroxysmal changes of rhythm with rapid ventricular rate, and thyrotoxicosis

Angina pectoris is characterized by central thoracic pain on effort, radiating to both arms and occasionally to the jaws or to the back, constricting in quality, and being relieved at once by rest, in severe cases it may occur at night, particularly [illegible]

[illegible] condi-
[illegible] pain of
any aetiology is the same, much of what follows applies only to occlusive coronary atherosclerosis

TREATMENT

Preventive

It is not yet possible to prevent coronary atherosclerosis, and attempts to lower the blood cholesterol by dietetic means have so far been unsuccessful There is no evidence that alcohol or tobacco has any bearing on the disease (Yater and his colleagues, 1948), neither is there any surety that the strain of modern urban life is culpable The prevention of hypertension is itself an unsolved problem

Management of mild to moderate cases

The majority of patients with angina pectoris are able to carry on sedentary occupations without distress for many years They should avoid any effort that causes pain and should reorganize their lives accordingly Sufficient rest should be ensured, particularly after meals, and a day in bed once a week may be helpful Diet should be light in bulk and in calorie value

Much may be done by correcting contributory factors such as obesity, anaemia diabetes mellitus, and anxiety; hypertension may call for special measures (*see* page 213)

The attacks themselves may be relieved by means of sublingual trinitrin, $\frac{1}{150}$–$\frac{1}{100}$ grain A tablet may be placed under the tongue before undertaking some necessary exertion which might cause pain Trinitrin acts as a coronary vasodilator (Lewis, 1934) and frequently lowers the blood pressure as well The inhalation of a capsule of amyl nitrite, 5 minims, is also effective, but its pungent smell and the vivid flush which accompanies its use may be embarrassing in public

Longer acting coronary vasodilators have not proved very successful in reducing the number of attacks, aminophylline, 0 1–0 2 gramme thrice daily or 4-hourly, has the best reputation Recent reports from Cairo have claimed that khellin, an extract of the seeds of *Ammi visnaga*, an Eastern Mediterranean wild plant, is more

of the risk of bacterial endocarditis Prophylactic sulphonamides (1 0 gramme twice a day for indefinite periods) have not proved their value in preventing either recurrent rheumatism or bacterial endocarditis, on the contrary, there is some evidence that they may encourage the development of sulphonamide resistant strains of streptococci The prompt treatment of streptococcal sore throat, when it arises, does not prevent a recurrence of rheumatic fever, but probably reduces the risk of bacterial endocarditis In an epidemic of sore throats rheumatic fever subjects should probably be protected with a sulphonamide, 1 gramme 3 times daily Prevention of infection by avoiding contact with streptococcal diseases and by maintaining the general health and resistance is more important Good social and working conditions, proper diet, and dental hygiene are helpful in these respects The use of communal swimming baths should be banned

A stricter régime is necessary in more advanced cases, when symptoms indicate impairment of the cardiac reserve, or when complications such as auricular fibrilla

are relatively free from breathlessness, tricuspid incompetence or stenosis may cause a very high venous pressure and gross enlargement of the liver, with or without oedema and ascites There may be no need to treat such cases as if they had congestive failure, on the contrary, they may often be able to continue with their work for many years

Rheumatic adherent pericardium requires no treatment, for it causes no special

resulted from the extra work involved in the heart's pulling on adherent structures, but a good deal of evidence has accumulated to show that this belief was baseless, and the operation has long since been abandoned

PROGNOSIS

All forms of rheumatic valve disease are progressive Patients with mitral stenosis and with aortic incompetence have the same life expectancy, the average age of death in both being about 35–40 years Tricuspid disease is rarely seen without mitral stenosis, and does not alter the prognosis Significant mitral incompetence and aortic stenosis, however, are usually less serious the former is rare, and

who may have lived long active lives

Brock, R C. (1948) *Brit med J*, 1, 1121

transient leucocytosis, and by acceleration of the erythrocyte sedimentation rate An electrocardiogram shows a pathognomonic pattern in over 95 per cent of cases

TREATMENT

Preventive

At least 10 per cent (probably nearer 25 per cent) of cases of cardiac infarction have premonitory symptoms before the major attack The sudden development of angina pectoris or its rapid deterioration, the recent occurrence of nocturnal pain, or the development of relatively long attacks, constitutes evidence of impending disaster Such cases should be regarded as medical emergencies and treated with anticoagulants at once

Heparin, 50 milligrams intravenously, should be given immediately, and continued 4-hourly for 2 or 3 days Dicoumarol, 300 milligrams, may also be given at once, followed by 200 milligrams on the second day, and 100 milligrams on the third, subsequent doses being regulated according to the prothrombin time as described under title Thrombosis in Veins Heparin is abandoned as soon as the prothrombin time is satisfactorily prolonged Dicoumarol should be continued for a minimum of 3 or 4 weeks or until the patient begins to improve Although it is too early properly to assess the results of such treatment, there is little doubt that spreading coronary thrombosis may be checked in this way, and that cardiac infarction may be prevented in some cases The risk of aggravating the condition by encouraging a subintimal haemorrhage is negligible

Management of acute cardiac infarction

Bed rest—All patients with acute cardiac infarction should be put to bed for an average period of 6 weeks In mild cases with no complications this time may be shortened to 3 or 4 weeks, in more severe cases 2–3 months may be necessary The sedimentation rate, if neither accelerated by complications such as pulmonary infarct, nor retarded by congestive heart failure, provides a good guide to the rapidity of healing

During the first fortnight complete rest in bed should be strictly enforced, for ventricular fibrillation, cardiac rupture, massive pulmonary embolism, heart failure, and paroxysmal rhythm changes are most likely to occur at this time ... ld degree ... phlebo ... order to ... hile the patient is in the horizontal position may disappear at once ... t is only necessary to nurse patients flat when the blood pressure is low and when there is danger of syncope

Diet—During the first 48 hours almost complete starvation is advised, nothing but soft fruits and fruit juices being allowed An 800-calorie diet per day for the next 2 or 3 weeks is also beneficial In this simple way the basal metabolic rate may be lowered appreciably, the heart rested, and the mortality rate halved (Master, 1936)

effective. The dose recommended is 100 milligrams by mouth 3 times a day (Anrep and his colleagues, 1946, 1947)

Treatment of severe cases

When angina pectoris causes incapacity more drastic measures are required

Bed rest—Three weeks complete rest in bed may greatly benefit patients with severe angina and should always be tried first It may be particularly helpful when symptoms are of relatively recent origin

Artificial myxoedema—Total thyroidectomy, introduced by Blumgart, Levine

enthusiasm, and has since been practically abandoned by its authors owing to the risk entailed by such a radical procedure in seriously ill patients, and to its irrevocable nature, moreover, post operative tetany resulting from the inadvertent removal of the parathyroid glands was not altogether rare

does not fall appreciably, the dose should be increased, or methylthiouracil, 0 2 gramme twice daily, should be added, bringing the total dose of mixed thiouracil compounds to 1 gramme daily (*see* page 173) The object of combining the preparations is to prevent sensitivity reactions such as fever, rash and agranulocytosis, which are more likely to occur when the same total dose of a single drug is used This principle holds good with sulphonamides while the same therapeutic effect is

per cent

Surgical methods—Attempts to establish a collateral circulation from without by surgical means, such as cardio-omentopexy (O Shaughnessy, 1936, 1937) have

doubtful On the

and upper dorsal

lure not only cuts

the pain pathways from the heart, but tends to prevent ventricular fibrillation (Leriche, Hermann and Fontane, 1931), and may improve the coronary circulation (Levy and Moore, 1941)

CARDIAC INFARCTION

Cardiac infarction means necrosis of a segment of heart muscle, and is usually due to coronary thrombosis It is characterized by thoracic pain similar in quality

PERICARDITIS

ACUTE PERICARDITIS

INTRODUCTION

Acute pericarditis, with or without effusion, may be *rheumatic, tuberculous,* pyogenic or traumatic; uraemic pericarditis and local or general pericarditis secondary to myocardial infarction are invariably dry; *malignant growths may*

penetrating wound of the heart, hydropericardium occasionally complicates congestive heart failure or myxoedema.

or absence
are usually
occurs in a
minority of patients and may be severe Pericardial effusion may also be symptom-

lobe of the left lung are also common with large effusions If the effusion is suppurative, toxaemia may be severe and the patient is usually very ill Cardiac compression may develop rapidly from haemopericardium caused in the ways mentioned Hydropericardium is almost invariably symptomless The general features of the condition which is responsible for pericarditis frequently overshadow

INDICATIONS FOR TREATMENT

Although the most important consideration *is usually the nature of the underlying* disease responsible for the pericarditis, the latter may require specific attention on the following grounds (a) because it is itself the principal disease, as in tuberculous pericarditis, (b) because as a complication it overshadows the primary *of pain in dry pericarditis,* or life of the patient in cases of ons will be considered first

LOCAL TREATMENT

Pericardial pain

Pain may be sufficiently severe to require morphine, ¼–½ grain, pethidine, 50–100 milligrams, or Physeptone, 5–10 milligrams. Local heat may be comforting Serious discomfort rarely lasts more than a few days

Drugs—Morphine, ¼–½ grain, is invaluable for relieving pain, allaying anxiety

alleged coronary vasodilators are without demonstrable effect Bromide and phenobarbitone, however, help to relieve anxiety and insomnia

Digitalis should be avoided unless congestive failure is becoming severe or unless paroxysmal auricular fibrillation or flutter lasts for more than 24 hours, it is dangerous because it increases the risk of ventricular fibrillation Adrenaline, ephedrine, and other adrenergic substances should be avoided for the same reason, no matter how low the blood pressure, bronchial spasm complicating left ventricular failure may be treated with aminophylline or with other harmless antispasmodics Heart failure usually responds satisfactorily to a low-sodium, low-calorie diet, to mersalyl, and to morphine, if digitalis is given, the greatest care must be taken to avoid toxic doses

Heparin and dicoumarol have been used recently to prevent further local or remote thrombosis, particularly perhaps to abolish the incidence of fatal pulmonary embolism, which is responsible for 5–10 per cent of deaths (Eppinger and Kennedy, 1938).

Convalescence

Most patients require 2 or 3 weeks to recover their strength after first getting up, and then 1 or 2 months' convalescence Few patients are fit to return to work in less than 3 months from the onset

After-treatment

The management of patients who have recovered from an attack of cardiac infarction is similar to that of patients with angina pectoris When effort pain is

Anrep, G V, Barsoum, G S, Kenawy, M R, and Misrahy, G (1946) *Brit Heart J*, 8, 171.
— — — — (1947) *Lancet*, 1, 557

Pyogenic pericarditis

Pericarditis, with or without effusion, may complicate streptococcal, pneumococcal or staphylococcal infection of any kind The pericardium becomes invaded by direct spread from the pleura, as in the majority of pneumococcal cases, from [illegible]

Treatment with penicillin, 30 000 units intramuscularly 3 hourly for a week, is usually curative Although good results are obtained by such treatment, it is probably wise to support it by introducing 10–30 millilitres of a solution of penicillin containing 1,000 units per millilitre directly into the pericardial sac, and by [illegible]

course, particularly perhaps when secondary to a staphylococcal myocardial abscess Surgical drainage may then be necessary

The subsequent course of penicillin treated cases appears to be satisfactory Some have already been followed up for several years and have not developed constrictive pericarditis It is probable, however, that a minority will do so

Sulphonamides are less effective, particularly in staphylococcal cases or when there is purulent effusion

Traumatic pericarditis

Haemopericardium resulting from blows over the heart, from penetrating stab wounds or gunshot wounds of the heart, or from injury of the coronary vessels may prove fatal owing to the rapid development of cardiac compression Such patients should not be allowed to die on the assumption that they have a fatal cardiac injury, for life may not infrequently be saved by relief of the compression and by surgical repair of the wound (King 1941)

A more interesting form of traumatic pericarditis follows gunshot wounds in which a metallic fragment or bullet lies in close proximity to the pericardium embedded in the myocardium in the pericardium itself, or just outside it In such cases recurrent attacks of acute pericarditis may occur usually at intervals of several weeks indeed, the first attack may not occur for 2 or 3 months after the injury during convalescence Although none seen by the author proved fatal they caused considerable alarm *If the foreign body is accessible it should be removed* during a quiescent phase (Wood, 1949)

CHRONIC PERICARDITIS

Adherent pericardium anchoring the heart to adjacent structures does not seriously interfere with cardiac function and does not require treatment (Hosler and Williams 1936) The operation of cardiolysis (Brauer, 1903–04) devised to free [illegible]

ilways

nding

structures or not and whether the pericardium is calcified or not The heart is unable to fill properly in diastole and cannot respond to rises in venous filling pressure

Cardiac compression

High-pressure effusion should be relieved by paracentesis, the chief evidence of serious cardiac compression being a high jugular venous pressure, considerable tachycardia, a falling blood pressure, a low cardiac output per minute, and pallor and coldness of the extremities due to compensatory vasoconstriction The best single indication (in an adult) is a systolic blood pressure below 95 millimetres of mercury

A large effusion may also be tapped because it is causing cough, orthopnoea and breathlessness, the vital capacity being greatly reduced, and the left lower lobe collapsed

To aspirate the pericardium is no more difficult than to aspirate the chest, and a similar technique is employed The needle is usually introduced an inch or two to the left of the midclavicular line in an area where the physical signs indicate plenty of fluid, commonly in the fourth or fifth space external to the apex beat (if it can be felt) Several hundred millilitres of fluid may be removed by means of a two-way syringe, Potain's aspirator, or by gravity suction, but quite small amounts, even 50 millilitres, may reduce the pressure considerably if the parietal pericardium is thick and inelastic

It should be emphasized, however, that cardiac compression requiring urgent treatment is rare, except when due to haemopericardium (*see* page 188)

SPECIAL TREATMENT ACCORDING TO AETIOLOGY

Rheumatic pericarditis

For the treatment of rheumatic pericarditis *see* page 194

Tuberculous pericarditis

Tuberculous pericarditis is usually severe and carries a high mortality; but relatively mild cases which recover spontaneously, and which do not develop Pick's disease later, may occur The majority are complicated by effusion

Infection may reach the pericardium from the pleura from the mediastinal lymph glands, or from the blood stream As a rule, pericarditis overshadows the primary lesion, or presents as the principal disease at the start

Treatment should be commenced as soon as the diagnosis has been established by positive cultures from fluid samples, or by proving the tuberculous nature of a related lesion such as mediastinal lymphadenopathy or pleural effusion Streptomycin should be given intramuscularly in doses of 1 gramme 3 times daily, and continued for 3 or 4 weeks Various modifications of such a course may be preferred, as in the treatment of bacterial endocarditis It is probable that streptomycin should also be introduced directly into the pericardial sac, but too few cases have yet been treated to warrant any valid expression of opinion on this point For the same reason, the results of treatment cannot yet be assessed.

Tuberculous pericarditis is by far the commonest cause of Pick's disease (chronic constrictive pericarditis) Many such cases represent spontaneous healing; others constrict when they are still active Whether streptomycin will increase the incidence of Pick's disease by saving life in the acute stage, or whether it will reduce it, remains to be seen

on page 365 By the time the cardiovascular system is involved the battle is already lost and the *prognosis is grave*

Remedial

Primary hypertensive pulmonary heart disease responds indifferently to all present methods of treatment, the course being steadily downhill to a fatal issue within 2 years of making the diagnosis Rest and the usual remedies for congestive failure prolong life but do not maintain health

Recovery may occur, however, when pulmonary hypertension is secondary to some known disease involving the pulmonary arteries, such as arteritis accompanying Loeffler's syndrome

Anoxic cases secondary to emphysema are rather more amenable to treatment,

pressants such as morphine, and by nursing the patient in an oxygen tent No cardiac remedies compare favourably with these methods, indeed, digitalis and venesection may be actually harmful in many cases (Howarth, McMichael and Sharpey-Schafer, 1947) If there is gross oedema, however, mersalyl and a low-sodium diet may be given, and if there is circulatory collapse digitalis may be helpful

If central cyanosis persists when bronchial spasm and secondary *infection have* been relieved, an attempt may be made to reduce the oxygen requirement by means of thiouracil (*see* page 173)

Gibbon, J H, Hopkinson M, and Churchill, E D (1932) *J clin Invest*, 11 543

Clin Sci, 6 187

and Dresdale, D (1947)

RHEUMATIC CARDITIS

Rheumatic fever is believed to represent an allergic or altered tissue reaction to the products of haemolytic streptococcal infection It is characterized by polyarthritis, pan carditis, chorea, subcutaneous nodules and erythema marginatum It may be acute, subacute, chronic, relapsing or recurrent

DIAGNOSIS

About 50 per cent of cases develop clinical evidence of cardiac involvement either during an acute attack or subsequently—usually both The diagnosis of ... sistent mitral or ve heart failure s showing pro but not proved g mitral systolic

The only way in which the heart can increase its output is by means of tachycardia Auricular fibrillation with a rapid ventricular rate occurs in about 25 per cent of cases

The majority of cases of chronic pericarditis are due to tuberculosis, a minority may follow pyogenic pericarditis, in others no aetiological agent can be established Tuberculous cases may produce constriction remarkably early, sometimes within a few months of the onset, when there is still considerable activity Most patients, however, are not seen until they are inactive and until constriction is far advanced

TREATMENT

The only effective treatment for Pick's disease is pericardiectomy (Churchill, 1929) The operation should be advised for all patients under 50 years of age, if it can be shown that active tuberculosis is not present The risk in older patients is

dangers of suppurative pulmonary and pleural complications The earlier the operation is performed, and the younger the patient, the better There is no object

siderably, as in cardiac compression

Brauer, L (1903–04) *Arch klin Chir*, 71, 258
Churchill E D (1929) *Arch Surg, Chicago*, 19, 1457

PULMONARY HEART DISEASE

DEFINITION

Pulmonary heart disease signifies functional changes in the heart secondary to disease of the pulmonary circulation or to disease of the lungs It may be acute, as in massive pulmonary embolism subacute, as in recurrent pulmonary thrombo-embolism and in secondary carcinomatosis of the lungs, or chronic, as in idiopathic pulmonary hypertension and in emphysema

MASSIVE PULMONARY EMBOLISM

At least 60 per cent of the total pulmonary circulation must be obstructed before the blood pressure falls and before the right ventricle is embarrassed, and probably over 80 per cent before death is likely (Gibbon, Hopkinson and Churchill, 1932)

The commonest cause of massive pulmonary embolism is phlebothrombosis in the legs or elsewhere, which is particularly common in congestive heart failure and

ACTH, the adrenocorticotrophic hormone of the pituitary, and cortisone both cause dramatic remissions in acute rheumatic fever With ACTH the pulse and temperature drop *within half an hour and the joint pain and swelling* disappear Cases have been known to relapse 10 days after discontinuing treatment, but have been controlled immediately by further ACTH

Carditis

The only effective treatment for carditis is rest in bed No drugs are of any value unless congestive heart failure develops, when digitalis, mersalyl, and a low sodium diet may be given in the usual way Patients should not be allowed up for 2 or 3 weeks *after the sedimentation* rate has returned to normal, assuming there are no other signs of activity If patients are permitted to get up too soon, relapse frequently follows at once

Pericarditis

Pain from pericarditis may be severe and may require morphine, $\frac{1}{8}$–$\frac{1}{4}$ *grain,* pethidine, 25–100 milligrams, or Physeptone, 5–30 milligrams Pericardial effusion very rarely, if ever, needs tapping Even when signs are present which might be attributed to cardiac compression, cardiac failure rather than effusion is usually responsible

Chorea

Patients with chorea are also best treated in bed until the acute phase has subsided, *whether they have other rheumatic lesions or not They may then be allowed* up but should be kept away from school and from social activities until they are fully recovered—usually a matter of 3 months or so Sedatives such as potassium bromide, 5–10 grains 3 times a day, or phenobarbitone, ½ grain twice or thrice daily, should be given when involuntary movements are extensive In fulminating cases, heavier sedation may be required The patient is best nursed in a darkened room in absolute quiet, no visitors should be allowed

Subacute, Relapsing and Recurrent Rheumatic Carditis

When the course of rheumatic carditis is subacute, relapsing or recurrent, great patience is necessary, and all forms of interference should be resisted Tonsillectomy has no effect on such cases and should only be performed when chronic tonsillar sepsis itself justifies the operation Sulphonamides and penicillin are equally in effective except as prophylactic agents They do not prevent the development of rheumatic fever when used to treat streptococcal sore throat, but they may prevent the sore throat when given at appropriate times, for example, when the child is in close contact with streptococcal infection *Prophylactic treatment of this kind* does not alter the course of subacute or relapsing cases, but may prevent recur [illegible]

most any intercurrent infection, a recurrence is a fresh attack [illegible] streptococcal infection, after the usual latent interval The prophylactic use of 1–2 grammes of a suitable sulphonamide daily during the autumn and winter is

If a recent history of haemolytic streptococcal infection cannot be obtained, it may be revealed by demonstrating a high antistreptolysin titre The best laboratory test of continued rheumatic activity is the erythrocyte sedimentation rate

TREATMENT

Patients with rheumatic fever should be confined to bed until all signs of activity have subsided For the most part they should be nursed in the position of maximal comfort, but those with congestive failure or severe carditis should be propped up against a back rest at an angle of 45 degrees This position lowers the venous filling pressure and thus reduces the work of the heart Diet should be light and nourishing A full complement of vitamins A and C should be ensured

POLYARTHRITIS

The fever and polyarthritis respond dramatically to sodium salicylate, but this [illegible]

symptoms which may be severe, they are tinnitus, deafness, hyperpnoea, nausea, [illegible]

development of any such haemorrhagic tendency should be countered immediately by blood transfusion or by injection of 10–15 milligrams of vitamin K, which restores blood prothrombin to normal Graham and Parker (1948) have shown that the toxic symptoms are related primarily to the plasma–salicylate level This is in accord with the clinical experience that toxic symptoms rapidly subside when the drug is discontinued

The sodium bicarbonate was given on the assumption that the symptoms of salicylate poisoning were due to ketosis Sodium bicarbonate is still given, though in a smaller dose than sodium salicylate, because it has some effect in preventing both nausea and vomiting, and by its effect in lowering the plasma–salicylate level it reduces the hyperpnoea Present-day practice is to give sodium salicylate, 120 grains, daily to an adult and 90 grains daily to a child aged 12 years If these doses cause toxic symptoms they are immediately reduced The sodium salicylate is given in divided doses with water after food, 4-hourly, with half the quantity of sodium bicarbonate, namely·

Sodium salicylate	20 gr	1 2 g
Sodium bicarbonate	10 gr	0 6 g
Liquid extract of liquorice	10 min	0 6 ml
Chloroform water, to	½ fl oz	15 ml

A small drink of water is given after the medicine and the patient lies quietly in bed without moving for a time

It is usual to continue salicylate medication in a smaller dose, namely sodium [illegible]

is given again

Reassurance is more important, for the attacks are not dangerous. The heart is not diseased and the prognosis is excellent. The patient should be encouraged to lead a full, vigorous life.

HEART BLOCK

Partial heart block requires no special treatment other than that directed towards its cause, for it has no ill effects. Complete heart block, on the other hand, is an important cause of syncope, which may result from extreme bradycardia, ventricular standstill, paroxysmal ventricular tachycardia, or transient ventricular fibrillation.

Clinical Description

Extreme bradycardia may also cause giddiness, confusion, drowsiness or semi-consciousness. In a case described by Spens (1793) the heart rate was 9 beats per minute, and the patient was "in great distress from constant sickness and faintness, but perfectly sensible and recollected".

One of the best clinical descriptions of complete heart block associated with syncopal attacks due to ventricular asystole is that by Stokes (1846). Loss of consciousness is abrupt, short-lived, and immediately followed by a vivid flush and complete recovery. Attacks occur most frequently at the onset of complete heart

[illegible]

Evans, 1941).

Treatment

In complete heart block the heart is unable to accelerate during effort, and can [illegible] The organ is consequently

[illegible]

Adams attacks is ephedrine hydrochloride, ¼–½ grain, 3 times a day or 4-hourly. Barium chloride, which acts by exciting ectopic beats, is relatively ineffective and [illegible] frequent, [illegible] -0·5 milli- [illegible] g *repeated* [illegible] ay also be

[illegible]

be complicated by paroxysmal ventricular tachycardia or by fibrillation.

open to question. Its danger lies in the chance that it may encourage the growth of resistant strains of haemolytic streptococci.

CONVALESCENCE

Convalescence from rheumatic carditis should be prolonged Three months holiday in the country is ideal When the child returns to school all forms of strenuous effort should be forbidden. Regular medical examinations, at first monthly, then quarterly and finally annually, are desirable Precautions should be taken against exposure to the elements, to undue fatigue, and particularly against contact with streptococcal infection

Convalescence from rheumatic fever without evidence of carditis need be no longer than that from any other infectious fever of equal severity, but subsequent medical examinations at infrequent intervals are advisable in order that the develop- [illegible]

of carditis or not, causes unnecessary hardship to about half of them, for 50 per cent of cases never develop rheumatic heart disease, moreover, such management tends to breed cardiac neurosis.

[illegible]

RHYTHM DISORDERS

SINO-AURICULAR BLOCK

Sino-auricular block rarely causes symptoms, unless it is complicated by unusually long periods of ventricular standstill. It is commonly found in otherwise normal individuals and is an expression of high vagal tone It may be characterized by a slow, regular heart rate around 40 beats per minute or by occasional dropped beats. The rate and rhythm become normal on exertion.

TREATMENT

Black-outs due to prolonged periods of ventric [illegible] by [illegible] 3 [illegible] helpful.

of the cervical vertebrae for 5–10 seconds. Carotid compression should never be performed simultaneously on both sides. This simple manoeuvre stops 50 per cent of attacks. If the paroxysm still continues it may be terminated in another 25 per [illegible]

include nausea, vomiting, colic, urgent micturition and defaecation, and faintness. *If such symptoms are severe they may be relieved at once by means of* 0·5–1·0 milligram of atropine intravenously. Prostigmin, 1–2 milligrams intramuscularly or *intravenously, is also useful It acts in about half an hour* and, although less often successful, has the advantage of being less drastic. Acetylcholine is not advised

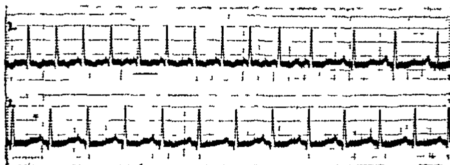


FIG 7.—Electrocardiogram illustrating restoration of normal rhythm by means of Mecholyl in a case of paroxysmal supraventricular tachycardia.

because it is apt to be destroyed when blood is withdrawn into the syringe prior to [illegible]

[illegible] idine should be em- [illegible] num of 40–45 grains [illegible] enance dose of 3–5 grains, 3 times a day. *Al* [illegible] underlying heart disease, 15–20 millilitres of 20 per cent magnesium sulphate solution may be in*jected slowly intravenously* (Szekely, 1946)

In about 20 per cent of the cases the attack continues *despite all efforts to stop it*, particularly when it is auricular in origin Digitalis should then be given with the object of producing 2 : 1 or greater A–V block in order to protect the ventricles (Fig 8). At any time the rhythm may revert to normal spontaneously.

[illegible] associated heart disease and impending or actual congestive heart [illegible]

fast, syncope may occur, but unconsciousness rarely persists when the pa[illegible] horizontal. *When there is associated hypertension* or when there is underlying

ECTOPIC BEATS

of palpitations due to ectopic beats, such complaints are commonly an indication of a personality defect or of an anxiety state Occasionally, multiple auricular ectopic beats herald the onset of auricular flutter, fibrillation or paroxysmal auricular tachycardia In rare instances, also, ventricular ectopic beats may be precursors of paroxysmal ventricular tachycardia or of ventricular fibrillation, particularly following coronary thrombosis or in diphtheritic carditis.

Treatment

Convincing reassurance is essential The patient should be encouraged to lead a normal active life Fresh air, exercise, tranquillity of mind, avoidance of over-indulgence in food, tobacco and alcohol, and early nights may be advised

Medicinal remedies are rarely required, but may be offered when ectopic beats are unusually troublesome Potassium bromide, 10 grains, 3 times a day, or

dose is 4 grammes given in a 10–20 per cent aqueous solution of potassium chloride or potassium acetate, 3 times a day or 4-hourly

PAROXYSMAL TACHYCARDIA

Paroxysmal Auricular or Nodal Tachycardia

Paroxysmal auricular or nodal tachycardia commonly begins in young people

days

Paroxysmal Supraventricular Tachycardia

This form of paroxysmal tachycardia in patients with diseased hearts, on the other hand, is a more serious matter Congestive heart failure usually develops and may prove fatal if the attack cannot be terminated The prognosis depends on the rapidity and duration of the paroxysm, and on the state of the heart muscle

Treatment

Patients with normal hearts should be reassured If they have not already learned

tion of the carotid artery at about the level of the superior border of the thyroid cartilage It should be located with the thumb and compressed against the bodies

are three principal methods of administration. Digoxin, 1·5 milligrams, may be

The second method, massive oral therapy, consists of tablets of digitalis leaf, 9 grains, followed by 6, 3, and 2 grains at 6-hourly intervals, the last dose being repeated as above. In the third method, which may be used if patients are not under constant medical supervision, it is safer to treat them with digitalis more slowly by giving tablets of digitalis leaf, 3 grains, 3 times a day, on the first day; 2 grains, 3 times a day, on the second; and 1 grain, 3 times a day, thereafter, until

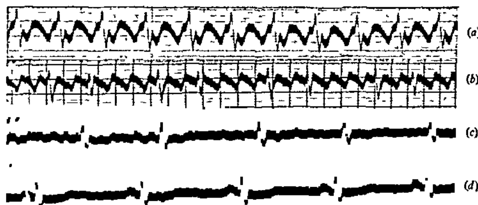


FIG. 9.—Electrocardiogram showing the effect of digitalis on a case of auricular flutter. (*a*) 2:1 auricular flutter; auricular rate 264. (*b*) After digitalis, auricular rate 288 (*c*) Auricular fibrillation caused by further digitalis. (*d*) Normal rhythm restored by means of quinidine.

the desired effect is obtained. With any of these methods the rhythm may revert to
... should be
... the face of
... when
... irregular

ported by a maintenance dose of digitalis. Quinidine is not infrequently ... when digitalis fails (Fig. 9).

EFFECT OF TREATMENT

The object of both drugs is to close the gap between the head and tail of the wave forming the circus movement. This would be readily achieved by employing a drug

disease of the coronary arteries angina pectoris may result Trin trin or morphine may then be required

PAROXYSMAL VENTRICULAR TACHYCARDIA



FIG 8 —Electrocard ogram show ng paroxysmal auricular tachycard a with a 2 1 or 3 1 A V block establ shed and ma ntained by means of d g talis

Treatment

Attacks are not influenced by the simpler measures outlined above nor by the

AURICULAR FLUTTER

Named by Jolly and Ritch e in 1910 auricular flutter was proved to be due to a circus movement of the excitatory impulse around the orifices of the venae cavae by Lewis Feil and Stroud (1918–20) From this source an excitation wave spreads over the auricles 260–340 times per minute Physiological 2 1 heart block generally develops the ventricles beating at half the speed Although paroxysmal in nature auricular flutter tends to be more persistent than paroxysmal tachycardia attacks usually lasting for weeks rather than for hours or days

Flutter is very rare in patients who are otherwise healthy It may complicate mitral stenosis hypertensive heart disease coronary thrombosis thyrotoxicosis and pulmonary heart disease It may sometimes be provoked by an infection particularly pneumonia

TREATMENT

The majority of patients with flutter develop congestive heart failure and should therefore be treated at rest in bed Digitalis should be given in large doses There

those employed for auricular flutter (*see* page 199), but it is rarely necessary to induce symptoms of intoxication in order to achieve the desired result A maintenance dose must then be continued indefinitely

It matters little what *preparation of digitalis is used,* although some are excreted more rapidly than others, and some are more expensive than others The following Table gives the equivalent strengths of the more common preparations

TABLE

Preparation	Strength
Tincture of digitalis	0.6 ml
Digitalis leaf tablets	0.06 g
Digoxin	0.25 mg
Digitoxin (Nativelle's Crystallised Digitaline)	0.075 mg
Strophanthin	0.25–0.15 mg

The tincture must be fresh and should never be mixed with other drugs, even so it is apt to vary in potency Tablets of digitalis leaf are cheap and vary remarkably little Digoxin and digitoxin, being pure crystalloids, have the advantage of fixed

(0.1 milligram) and $\frac{1}{250}$ grain (0.25 milligram) This is unfortunate because the usual maintenance dose is 0.15 milligram daily Strophanthin has the advantage of being rapidly excreted and is the drug of choice when only a transient action is required

The average maintenance dose is digitalis leaf tablets 1 grain twice a day, or its equivalent, but it ranges between 1 and 3 grains daily Signs and symptoms of intoxication include anorexia, nausea, vomiting, diarrhoea, oliguria irregular or alternate ventricular ectopic beats (coupling) heart block, paroxysmal tachycardia *and even ventricular fibrillation Less common are coloured vision* (usually brownish yellow) and psychiatric disturbances It is usual to withhold the drug for 48 hours whenever frequent ectopic beats, anorexia or nausea develop In cases of

the heart rate is

and mersalyl therapy, *may cause dangerous concentration of digitalis*

This may explain those cases in which sudden death from ventricular fibrillation occurs at the very moment when the patient appears to be doing so well It is wise, therefore in cases of gross oedema, to reduce the dose of digitalis, or even to withhold the drug for 24 hours when diuresis is extreme Especial care in this respect should be taken in cases of *ischaemic heart disease* When cases of auricular fibrillation do not respond well to digitalis, the aetiology should be reviewed, with particular reference to the possibility of thyrotoxicosis

ted to three well defined groups

y, thiouracil or by

dence of structural

muscle but lengthens the refractory period. The speed of the f-waves is consequently slowed and may reach rates of less than 220 per minute. The ventricle may then respond with a 1 : 1 ratio, and the change may be incorrectly interpreted as paroxysmal tachycardia and attributed to quinidine, moreover, with such fast rates, functional bundle-branch block is not uncommon, and may give rise to a false diagnosis of paroxysmal ventricular tachycardia, also attributed to quinidine. Hence the necessity for supporting quinidine therapy with digitalis, in order to preserve sufficient A–V block to prevent a 1 : 1 ventricular response. The circus movement is only abolished when the effect of quinidine on the refractory period is greater than its effect on conduction, which may be expected in at least 50 per cent of cases.

When flutter remains resistant to such treatment the situation must be accepted and a maximal maintenance dose of digitalis should be prescribed. Fair results are then obtained, but undue tachycardia is apt to develop on little provocation

Treatment directed to the underlying heart disease may have a favourable influence on flutter. This is seen particularly in thyrotoxicosis and in pulmonary heart disease secondary to emphysema Again, flutter provoked by pneumonia may disappear spontaneously after penicillin or sulphonamide treatment.

AURICULAR FIBRILLATION

TREATMENT

The adverse effect of auricular fibrillation on the function of the heart is due to the rapid and irregular ventricular response, so that the heart works overtime and at a mechanical disadvantage, many of the beats being wasted Treatment is there-

Digitalis

Digitalis acts by depressing conduction in the bundle of His, so that relatively few of the impulses reach the ventricles The pulse can thus be slowed to a normal rate, though it remains irregular. The methods of administration are similar to

Mackenzie, J (1902) *Study of the Pulse* Edinburgh and London, Young J Pentland
Parkinson, J, Papp, F, and Evans W (1941) *Brit Heart J*, 3 171

SYPHILITIC AORTITIS

(See also Venereal Diseases)

INTRODUCTION

Syphilitic aortitis is clinically unrecognizable until it causes dilatation of the aorta (fusiform aneurysm), saccular aneurysm, or aortic incompetence with or without angina pectoris Syphilitic myocarditis and endocarditis are extremely

confirmed by a history of syphilis, signs of syphilis in other systems, a positive Wassermann reaction or Kahn test, and by a high blood sedimentation rate

INDICATIONS FOR TREATMENT

All cases of syphilitic aortitis should be given a full course of anti syphilitic treatment whether there is aneurysm, aortic incompetence, angina pectoris, or even heart failure Naturally, the earlier treatment can be commenced the more effective is it likely to prove, and there may be little point in attempting to eradicate the spirochaete when the damage is already far advanced The object of treatment is to prevent further damage, it is impossible to repair that already done, although symptoms may be alleviated to some extent by other measures

ANTI SYPHILITIC TREATMENT

The patient should be put to bed for a minimal period of 6 weeks The first complete course of treatment is then planned as follows

(2) At the end of the fourth week penicillin is recommended in minimal doses of 30 000 units 3 hourly for 10 days, making a total of 2½ million units Larger doses given rather less frequently may be permissible if the circumstances seem to demand it, or penicillin may be given in oil as described on page 25

(3) The patient is allowed up in the seventh week, and should commence bismuth in doses of 0 2 gramme intramuscularly at weekly intervals, to a total of 2 4 grammes

(4) The patient should then be put back to bed, and arsenic is given in the form of neoarsphenamine intravenously The initial dose should not exceed 0 15 gramme,

heart disease; thirdly, cases in which auricular fibrillation has developed prematurely owing to some adverse factor which has since ceased to operate. Restoration of sinus rhythm when auricular fibrillation has developed in the natural course of chronic incurable heart disease is never long maintained, and therefore carries an unwarrantable risk of embolism and guarantees a second attack of heart failure when the relapse occurs.

Quinidine

Normal rhythm may be temporarily or permanently restored by means of quini-

to bed under medical supervision A trial dose of quinidine, 3 grains, is then given

is at once reduced to a maintenance dose of 5 grains, 3 times a day, and continued for one month, if a very small dose was required to bring about a successful result, the maintenance dose may be reduced to 3 grains, 3 times a day for the same period, or withheld altogether

As explained on page 201, quinidine slows conduction and increases the refractory period in auricular muscle and therefore slows the auricular rate It is not uncommon, in fact, for fibrillation to be temporarily changed into flutter with an

conduction.

mended

standstill

If auricular fibrillation reasserts itself while the patient is on a maintenance dose of quinidine, 3 grains, 3 times a day, a further course of treatment followed by a larger maintenance dose of quinidine, for example, 5 grains, 3 times a day, may be given before abandoning quinidine treatment.

Lewis, T (1925) *The Mechanism and Graphic Registration of the Heart Beat* London, Shaw
— Drury, A N, and Iliescu, C. C. (1921) *Heart*, 8, 361
— Feil, H S, and Stroud, W D (1918–20) *Heart*, 7, 191

Szekely, P. (1946) *Brit Heart J*, 8, 115.

SYPHILITIC AORTITIS

(*See also* Venereal Diseases)

INTRODUCTION

Syphilitic aortitis is clinically unrecognizable until it causes dilatation of the aorta (fusiform aneurysm), saccular aneurysm, or aortic incompetence with or without angina pectoris Syphilitic myocarditis and endocarditis are extremely rare Congenital syphilis does not cause aortitis (McCulloch, 1930)

occur in about

fter the primary

INDICATIONS FOR TREATMENT

All cases of syphilitic aortitis should be given a full course of anti syphilitic treatment whether there is aneurysm, aortic incompetence, angina pectoris, or even heart failure Naturally, the earlier treatment can be commenced the more effective is it likely to prove, and there may be little point in attempting to eradicate the spirochaete when the damage is already far advanced The object of treatment is to prevent further damage, it is impossible to repair that already done, although symptoms may be alleviated to some extent by other measures

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subsequent doses being 0 3 gramme, 0 45 gramme and finally 0 6 gramme at weekly intervals, the last dose being repeated until a total of 4 5 grammes is reached

(5) If the blood Wassermann reaction and sedimentation rate are then normal, [illegible] six months, a [illegible] e Wassermann [illegible] d, a complete second course of treatment is advised after an interval of one month There is no need, however, to give iodine or mercury the second time, and the patient need not retire to bed except during the administration of penicillin

(6) Third and fourth courses of penicillin, bismuth and arsenic need only be given if the Wassermann reaction and sedimentation rate remain abnormal

Arsenicals may have to be abandoned at any time if angina pectoris or heart failure develops or increases True Herxheimer reactions are fortunately rare.

It is too early to assess results of penicillin in syphilitic aortitis but untoward reactions are surprisingly rare whether the initial dose is 1,000 or 100,000 units (Moore, 1947)

OTHER MEASURES

Aneurysm

Saccular aneurysm may cause a variety of symptoms depending upon what surrounding structures become compressed Most complications which arise in this way are obvious and may call for appropriate treatment, thus pulmonary infection may occur in a collapsed lobe distal to bronchial obstruction, oedema of the head and arms, which may gravitate to the legs, may result from pressure on the superior vena cava, but by far the most important of such symptoms is root pain associated with spinal erosion Rest in bed, combined with powerful analgesics, such as pethidine, 50–100 milligrams, or Physeptone, 5–10 milligrams, may be necessary The object of rest is to reduce the pressure within the aneurysm

When pain is intractable, surgical help should be considered Wiring has been practically abandoned on account of the risk and the uncertainty of producing [illegible] aneurysm This procedure may well gain favour; it relieves pain, and may prove an effective way of preventing expansion and rupture of the sac.

Angina Pectoris

[illegible] is not too gross.

RESULTS OF TREATMENT

Statistically the effect of full anti-syphilitic treatment has been to increase the average life-expectancy from 18 months to 2 years (Padgett and Moore, 1935) This seems little reward for so much labour, but it should be realized that to obtain such a result relatively early cases must do well, for treatment is unlikely to benefit late cases, and many are already far advanced when first diagnosed Whether penicillin will improve the outlook remains to be seen

Babcock, W W (1926) ' New Treatment of Thoracic Aneurysm " *Ann clin Med*, 4 933
— (1932) "Newer Surgical Methods of Treating Diseases of the Vascular System " *Amer J Surg*, 16, 401
McCulloch, H (1930) ' Congenital Syphilis as a Cause of Heart Disease " *Amer Heart J*, 6, 136
... Treatment of Syphilis with Penicillin " *Proc R*
"The Results of Treatment in Cardio-vascular
tment of Syphilitic Aneurysms with Report of
J, 36 252
Thompson W P, Comeau W J, and White, P D (1939) "The Role of the Treatment of Syphilis in the Prevention of Cardiovascular Involvement " *Amer Heart J*, 17, 286

TRAUMATIC LESIONS OF THE HEART AND GREAT VESSELS

INTRODUCTION

Traumatic lesions of the heart or great vessels may occur spontaneously as a ... or they may be due to direct or indirect violence
... of a hypoplasic
... alve in bacterial
... ysm of a sinus of
... of chordae tendineae
... e
plications of diseases whose treatment has been described elsewhere, only dissecting aneurysm warrants special consideration

The second group includes stab and gunshot wounds of the heart, and the indirect effects of crushes, falls, blows or blast, *for example sudden death from* ventricular fibrillation or asystole, rupture of the aorta or of any of the cardiac ... with or without haemopericardium, and
... ock Coronary
... sent a difficult
medico-legal problem

DISSECTING ANEURYSM

Dissecting aneurysm of the aorta accounts for about 1 per cent of all sudden *deaths and is believed to depend primarily upon* cystic medial necrosis (Erdheim, 1929) Haemorrhage into the diseased area may come from the vaso vasorum or from a primary tear in the intima, in the former event the intima is usually torn

subsequent doses being 0 3 gramme, 0 45 gramme and finally 0 6 gramme at weekly intervals, the last dose being repeated until a total of 4 5 grammes is reached

(5) If the blood Wassermann reaction and sedimentation rate are then normal, [illegible]

second course of treatment is advised after an interval of one month There is no need, however, to give iodine or mercury the second time, and the patient need not retire to bed except during the administration of penicillin

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aneurysm This procedure may well gain favour, it relieves pain, and may prove an effective way of preventing expansion and rupture of the sac

Angina Pectoris

Severe angina may prove difficult to relieve by conservative methods In such cases thiouracil may be tried as described on page 173 If this fails, stellate and upper dorsal ganglionectomy should be considered As the coronary vessels distal to their mouths are usually healthy, operations designed to encourage the collateral circulation from without should have a chance of succeeding if aortic incompetence is not too gross

(3 cases), occlusion of renal artery (2 cases), aneurysm of renal artery (1 case) and renal infarct (1 case)

Urinary delay or obstruction—Hydronephrosis, infected hydronephrosis, prostatic obstruction, urethral stricture

Treatment

Bilateral kidney disease—In those of the above diseases which are bilateral, namely acute and chronic nephritis, renal dysbiotrophy, polycystic kidneys and periarteritis nodosa of the kidneys, the treatment is that of the primary disease In addition, in certain cases, symptomatic treatment of the hypertension may be indicated

Unilateral kidney disease—In those diseases which are unilateral, removal of the diseased kidney may be beneficial or curative The indications for nephrectomy are unilateral kidney disease of such degree as to have rendered the diseased kidney almost or completely functionless as judged by intravenous pyelography, provided that the other kidney is functionally intact and total renal function is normal Although this direction as to nephrectomy is simple, the operation may fail even when the above conditions seem to be clearly fulfilled In a proportion of cases, however, the operation is curative, the patient's recovery is complete and the blood pressure drops to a normal level In some apparently successful cases the blood

failures, 6 were partial successes and 13 were doubtful There is better expectation of a successful result in younger patients and when the hypertension has been established for less than two years Better results are obtained with pyelonephritis and congenital abnormalities than with hydronephrosis or calculus (Langley and Platt) The operation may be successful in older patients and even when the hypertension is known to have existed for as long as 10 years On the other hand a family history of hypertension militates against a favourable result, perhaps because in these patients unilateral kidney disease is only an aggravating or precipi-

are these Is the im-
re is doubt as to this
ibar sympathectomy

first and to decide as to nephrectomy at a later date according to the results of the sympathectomy Further, functional integrity of the other kidney may be difficult to establish It should be established by normal urine obtained by ureteral catheterization, normal renal function tests, and normal pyelography Even so, certain forms of chronic nephritis and progressive essential hypertension are difficult to exclude Lastly, the operation may be justified by results even though the criteria for nephrectomy are not completely established

Urinary delay or obstruction—When this is cleared, as by prostatectomy, the blood pressure may return to normal

ENDOCRINE DISEASE

Adrenal glands—Both medullary pheochromocytoma and cortical carcinoma of the suprarenal glands may cause hypertension and their removal by operation

secondarily In either case blood penetrates into the media from the lumen of the aorta and proceeds to dissect the vessel in its middle coat External rupture into the pericardium, left pleural cavity or elsewhere is responsible for death in most instances, occasionally, dissection ruptures back into the lumen of the aorta

The condition is characterized by extreme pain across the chest and between the shoulder blades and sometimes by pain in the abdomen or lower back Shock is common or coma may be due to obliteration of the carotid arteries A variety of ischaemic effects may result from occlusion of any of the branches of the aorta, both visceral and somatic

Treatment

There is little that can be done for these cases except to combat pain by liberal doses of morphine and to insist on absolute rest and quiet The patient must be moved as little as possible and even an enema is better withheld for several days Starvation or semi starvation for 48 hours is also desirable The object of this treatment is to prevent fatal external rupture in the hope that the situation may be saved by rupture re-entry into the lumen of the vessel Such cases should be kept in bed for 6 weeks Patients who survive the acute attack may live for several years, but tend to die from congestive heart failure eventually, either from associated hypertension or from aortic incompetence caused by the dissection (Shennan, 1934)

STAB WOUNDS

Penetrating stab wounds of the heart may cause death from haemorrhage or from cardiac compression resulting from haemopericardium The latter is usually present in patients that survive long enough to receive medical attention

Treatment

Treatment is surgical and consists of relief of cardiac compression and direct repair of the wound Conservative methods in patients who appear to be holding their own are not advised, for haemorrhage rarely stops spontaneously, whereas the results of surgical intervention are excellent (King, 1941)

GUNSHOT WOUNDS OF THE HEART

Bullets or metallic fragments from shells, bombs and other projectiles may pierce

require urgent surgical repair, on the other hand, it must be admitted that the majority of those who live long enough to reach a base hospital, where such repair is feasible, recover spontaneously if left alone

treated conservatively should remain in hospital for 3 months, for sudden attacks of pericarditis with rapid development of tense effusion may occur at any time during this period, especially if the foreign body is close to the pericardium Such

HYPERTENSION IN PREGNANCY

pregnancy and healthy baby But with a blood pressure at this level an initial period of rest in bed and a sedative at night should be prescribed with the object of reducing the blood pressure, and in the hopes of keeping it to the lower level by ordering extra rest throughout the pregnancy Browne (1947) regards a blood pressure level of 160/100 as "critical" especially if it is accompanied by albuminuria; in such cases there is a risk of the death of the foetus *in utero* from concealed accidental haemorrhage, but careful treatment throughout the pregnancy can do much to diminish this risk (Browne) The writer's opinion on this difficult subject is that pregnancy of itself does not necessarily aggravate hypertension, but it is a tax on a woman's strength Just as a man with essential hypertension is advised to limit his activities to well within the measure of his reserves of physical and emotional strength, so with a woman to whose ordinary life the creation of a

depends on the actual physical condition

Pregnancy toxaemia occurring in the later months of pregnancy is the cause of hypertension There is not, however, at present sufficient information available to allow of a definite opinion as to whether pregnancy toxaemia can be the cause of persistent hypertension (in its clinical features approximating to benign essential hypertension, or to a very low-grade chronic nephritis) in a woman who is not ... potentially so The two important gaps in our ... readings ... cy and in ... known

ESSENTIAL HYPERTENSION

BENIGN OR SIMPLE HYPERTENSION

Whereas symptomatic hypertension accounts for the majority of cases of raised

sion is aggravated by continued emotional strain and physical ... attempt has been made to associate essential hypertension with personality

may be a curative procedure Partial adrenalectomy for cortical hyperplasia is not advised

Pituitary gland—The evidence for the association of the pituitary gland with hypertension is based chiefly on the presence of hypertension in Cushing's disease The treatment is that of the primary disease

who suffer,
on The
subtotal
thyroidectomy is done it will not improve the hypertension, if a subtotal thyroidec-
hypertension
other hand,
of deficient
extract may
the patient's

CARDIOVASCULAR DISEASE

Heart failure—(*See* Ischaemic Heart Disease, page 182)

Coarctation of the aorta—The clinician should always have this possibility in mind It is easily overlooked The treatment is surgical A short obstruction may be treated by an end to end repair, but usually the obstruction is elongated and spindle shaped giving an hour-glass effect so that an excision of up to 1½ inches of the aorta may be necessary In such a case over sewing of the proximal end of the aorta may be required so that the distal portion may be anastomosed to the left subclavian artery

NEUROGENIC HYPERTENSION

Under this heading, Page (1949) includes poliomyelitis of the brain stem, porphyria, increased intracranial pressure, sclerosis of the carotid sinus, resection of the glossopharyngeal nerve, tabes dorsalis and emotion With regard to these aetiological factors practically speaking the effect of emotion on blood pressure is the only one of much concern in the treatment of hypertension These conditions are referred to because nervous influences, at present only vaguely understood, are of at least equal importance to biochemical factors in the aetiology of hypertension

TOXIC FACTORS

Lead poisoning and alcohol are the two important exogenous toxins Hypertension is not part of the clinical picture of severe alcoholic poisoning as are delirium tremens, cirrhosis of the liver and alcoholic neuritis, nevertheless an individual may develop hypertension as a result of alcoholic excess, especially of champagne and brandy, or at least the blood pressure returns to normal on a teetotal regimen

human subject (Goldblatt, 1948) *Moschcowitz (1942)*, has assembled the evidence in favour of the view that hypertension causes arteriosclerosis, nevertheless it is still possible that some pathogenic agent, hormonal or neurogenic, causes hypertension and at the same time, or alternatively, causes arteriosclerosis according to circumstances at present not known to us The treatment of hypertension, therefore,

activities or shorten his life When the practitioner surmises this state of affairs

Such a patient may have what may be termed attacks of hypertension from time to time, attacks recognized by symptoms reasonably attributable (in the absence of other disease) to hypertension, namely headache, giddiness, vertigo, lack of energy and initiative, lack of power of concentration, failing memory and fatigability These attacks may last 2–6 months before they peter out Alternatively, the patient may suffer from a complication of hypertension such as hypertensive ... vascular spasm, hypertensive heart disease or ... All these conditions are indi... sive therapy depending on the ... es of several years, between the attacks, there may be no indication for special treatment

INDICATIONS FOR TREATMENT

Recent hypertension—If there is a ... being of recent origin, or possibility ... *patient should be advised a period o* ... or vegetarian diet With this treatment there may be a fall in blood pressure to a lower level After a period of convalescence, some modification of the hours of work or of the day's routine may be advised, and a lasting improvement may result It is possible that an aggravating circumstance may determine hypertension in a potentially hypertensive subject and that the hypertension may persist as a mere ... ymptoms of hypertension are ... ical and mental fatigability ... e a detailed investigation to exclude disease of the suprarenal glands

... alone hyper-

...

...d a good example ...
...p hypertension, whereas
...onmason, 1929) Hyper-
..., thickset, a heavy build
...d degree of acromegaly.
... of all this in

...

faced

Treatment

Coincident, aggravating or determining conditions

Obesity—If an obese patient has hypertension, whether suffering from it or not, ... (see Adiposity, page 592) Another method of ...

...

giving thyroid

Graves's disease—Subtotal thyroidectomy has no place in the treatment of hyper- ... are best regarded from the point of ...iathesis ...ption applies to the associa- ...ressure may fall to normal ... but in the ...

Emotional and physical fatigue

The importance of these factors is well known and for this reason a period of rest in bed and the prescription of barbiturates is effective treatment for many patients with hypertension and it may with advantage be repeated from time to time Attention should be paid to the effect of environment in respect of home ... of children with hypertensive inheritance. Indi-

...

TREATMENT OF HYPERTENSION

Introduction

The actual cause of essential hypertension is still obscure and it is doubtful whether a chemical mechanism identical to that operating in experimental renal hypertension plays a significant role in the pathogenesis of benign hypertension in the

for patients who are overweight The food restriction should include *protein, f* and carbohydrates, and extra fruit and vegetables should be eaten

As to whether the brunt of this restriction should fall on protein fat or carbo hydrate is less certain There is a close relation between hypertension and arterio *sclerosis and there is some evidence that an ample fat intake promotes arterio*

prescribed for hypertensive patients

It is generally agreed that hypertensive subjects should have an ample vitami *intake*

Medicinal treatment—Perhaps most patients who suffer from hypertension though not the majority of those who simply have hypertension, benefit by sedation Present-day practice is to prescribe a barbiturate such as *phenobarbitone*, ¼—grain, twice daily and ½ grain at bedtime, alternatively, tablets of Amytal, ½ grain before breakfast and supper, and phenobarbitone at night, or Sodium Amytal 3 grains It is obvious that the prescription of these drugs is a confession of failur and that it is to the patient's advantage if a quiet mind and peaceful sleep at nigh *can be secured by simple means on the lines suggested in the foregoing paragraph* that deal with rest and exercise Alternative sedatives are bromide and chlora hydrate

Rutin is prescribed when there is a haemorrhagic tendency, as for instance wher there is microscopic haematuria and especially in the presence of retinal haemor rhages The initial dose is 40 milligrams taken 3 times daily after meals (Rutir Tablets (A & H), 20 milligrams), the maintenance dose is 20 milligrams 3 times daily and it may be taken, perhaps with advantage, continuously for a year or more The value of rutin is not yet certain Iodine, iodides, nitrites and theobromine are probably of little or no value

Pill of mercury, 3 grains, or pill of mercury, 2 grains, combined with compound pill of rhubarb, 2 grains, *taken at bedtime twice or three times a week* and followed by a small dose of salts in the morning, may benefit some patients Alcohol and tobacco are allowed in moderation

Veneseciion—Venesection may be of value in the treatment of a plethoric subject with hypertension, especially if there is peripheral congestion as shown by a ... congested nose ears and fingers Whether or not it is accom ... venesection of from 15 to 20 ounces may give ... to 6 months Venesection may be part of the routine treatment of exacerbations of hypertension or phases of activity of the underlying disease

Venesection is less often employed than it might be, partly because there has not *seemed to be a rational basis for it, but since dorsi* lumbar sympathectomy may permanently cure severe hypertensive retinopathy, whatever the post operative blood pressure may ultimately be, it has been thought that some at least of the exhibitions of hypertensive disease may be due to venule or capillary congestion If this is true, venesection becomes a more rational procedure

Hypertension with complications—Hypertensive retinopathy, transient pareses and other symptoms of cerebral vascular disturbance in hypertensive subjects, breathlessness on exertion and other cardiac symptoms, and albuminuria, even though slight, associated with hypertension

Severe hypertension—A diastolic pressure of 120 millimetres of mercury or over indicates severe hypertension

The above are all indications for the treatment of hypertension and, according to the opinion formed as to the gravity of the case, conservative or intensive measures are adopted

pressure does not fall lower than 120 millimetres of mercury with conservative treatment, probably justifies the diagnosis of malignant hypertension The most

tion for intensive treatment

CONSERVATIVE TREATMENT

A period of conservative treatment should be the first stage in the treatment of any patient with hypertension Conservative treatment consists of the regulation of rest and exercise the prescription of sedatives symptomatic treatment and perhaps venesection

Rest—The prescription of rest may mean rest in bed for a period from 2 to 8 weeks, or it may mean rest from work for a period of one to three months Apart from these extremes of rest, there are a variety of modifications in the individual s

object of treatment to keep a man at work and a woman occupied in her house or gainfully employed because the work to which a person is accustomed is the best exercise Physical exercise especially rhythmical movements as in walking and horse-riding is good for the circulation and has a sedative effect

indigestion it is given with food At the end of one week's *treatment the concentration* of thiocyanate in the blood is estimated Cases are then divided into four groups

Group 1 Serum level 4 *milligrams per cent or less* The weekly dose is *increased to* [illegible]

Group 2 Serum level 5–7 milligrams per cent The weekly dose remains at 2 1 grammes The serum thiocyanate is estimated again at the end of the second week

Group 3 Serum level 7–10 milligrams per cent The weekly dose should be reduced to 1 4 *grammes and the serum thiocyanate estimation is repeated at the end of a further week*

Group 4 [illegible]

*Subsequent dosage depends on experience gained in the first fortnight of treat*ment, and the dose of potassium thiocyanate remains the same during the third week of treatment, or is increased or decreased by 0 4 gramme weekly according to indications provided by the second serum thiocyanate estimation The dose should never be increased by more than 0 4 gramme weekly A third serum estimation is made at the end of a further week or fortnight, and after this it may be possible to make the interval a fortnight or a month The effect of an alteration of dosage must be checked by a serum thiocyanate estimation at the end of a week or, at *the latest*, within a fortnight of the change being made

Control of treatment —The quantity of potassium thiocyanate taken depends on serum estimations Blood pressure readings are no criterion of dosage A brief written record should be kept of the essential features of the case under the headings of date, blood pressure, weekly dose of potassium thiocyanate, serum thiocyanate concentration and patient's symptoms These notes are kept in tabular [illegible] d's eye view of the treat- [illegible] period even of years can be seen at a glance

Toxic effects —Symptoms of intolerance are rash, malaise, asthenia, loss of appetite, nausea, indigestion, pains in the limbs and impotence The significant symptoms are rash, excessive tiredness and nausea The rash varies considerably in appearance and distribution, characteristically it is a macular, papular rash, somewhat irritating, and terminating by scaling The macules may be sharply defined and are followed by pigmentation, which ultimately fades out A common distribu- [illegible] on the lower third of the [illegible] with a serum [illegible] its disappear- [illegible] followed by a [illegible] of treatment [illegible]

first time at a late stage in the treatment is of significance, [illegible] ate concentration should be checked up at once If the asthenia is *considerable* the

INTENSIVE TREATMENT

Potassium thiocyanate

Potassium thiocyanate (Watkinson and Evans, 1947) has been used in the treatment of hypertension for many years It has become more widely used since Barker (1936) instituted the present system of controlling the dose of potassium thiocyanate by estimation of the concentration of the drug in the blood, carried out at frequent intervals By this means dangerous toxic effects can be avoided

Indications—Treatment with potassium thiocyanate is additional to and does not replace other treatment which may be indicated for the patient with hypertension It is chiefly advised when conservative treatment has failed, in the presence of symptoms due to hypertension and when the diastolic pressure is over 110 millimetres of mercury Since the treatment is symptomatic and in no sense curative, and since it must be controlled by serum thiocyanate estimations it should not be undertaken unless there is a real indication for it The patients most likely to respond to treatment with potassium thiocyanate are those of the so-called vascular group that is the cerebral cases with headache and giddiness Those in whom cardiac symptoms namely breathlessness palpitations and cardiac pain, are prominent, are less likely to be relieved Patients with renal damage in the malignant phase of hypertension are least likely to respond to treatment Good results are most often obtained when the arteriosclerotic disease is in a quiescent phase (Evans 1943) In the quiescent phase of arteriosclerotic disease there is an amelioration of symptoms in about 60 per cent of cases treated with significant [illegible]

[illegible]

mined by clinical trial over several weeks, during which an adequate serum concentration has been maintained

Outline of treatment—The objective is a constant concentration of serum thiocyanate of 6–9 milligrams per cent Good results are obtained in some cases with lower concentrations If the concentration rises above 15 milligrams per cent serious toxic effects may be expected More than 10 milligrams per cent is not allowed Repeated estimations of serum thiocyanate concentration are essential, first weekly, and later at monthly intervals ultimately the intervals may be of 3 or even 6 months The dose required to obtain this concentration varies widely in different individuals It may be as low as 1 gramme per week or as high as 4 grammes per week

The patient is [illegible]
matic treatment
diet and so on
a period of 4–10 days, and potassium thiocyanate in a dose of 0 1 gramme (1½ grains) is given in the following form

Potassium thiocyanate	1½ gr	0 1 g
Chloroform water, to	½ fl oz	15 ml

One tablespoonful with water is taken 3 times daily after meals, if it causes

symptoms of salt privation are restlessness, apathy and mental confusion which may lead to coma and death

According to Kempner (1948) the indications for prescription of the rice diet are arteriosclerotic and hypertensive vascular disease, with cardiac, cerebral retinal or renal involvements He also advises it in serious cases of acute and chronic nephritis and in heart failure which does not respond to ordinary treatment of salt restriction and drugs It must be realized that it is intensive therapy and it should not be undertaken unless it can be controlled by ' frequent checks of the patient's blood and urine chemistry" (Kempner, 1948), that is to say, blood urea blood sodium and chloride, estimation of the urine chloride serves as a check on the patient's intake of salt

The best results are gained by carefully controlled treatment in an institution When a satisfactory improvement has been established (in Kempner's series the diet was beneficial in 322 of 500 patients) the diet is varied and its sodium content increased up to the limit of the patient's tolerance of increased sodium The patient may be symptomatically improved by a period of restricted diet from time to time, with intervals of a more nearly ordinary diet

Dorsi lumbar sympathectomy

Smithwick (1948) has established the value of surgical treatment for patients [illegible] benign and malignant In the writer's [illegible]

[illegible]

of retinopathy and in patients who fail to respond to [illegible]

[illegible] women than in men, and [illegible] 45 years It is generally [illegible] tients with pronounced arteriosclerosis, in the presence of severe heart disease, and in renal function failure Patients who have had one or more cerebral vascular accidents do not generally benefit from surgical treatment

CONCLUSION

Whereas, generally speaking there has been a tendency to over-emphasize the importance of essential hypertension there is no doubt as to the gravity of severe hypertension, as in patients whose diastolic pressure persists at a level of 120 milli metres of mercury or over, patients with retinopathy, especially papilloedema, and any suggestion of kidney involvement

The plan of treatment is first with conservative measures followed when neces sary, by one or more of the intensive methods of treatment described above Whether potassium thiocyanate, rigid salt restriction or dorsi lumbar sympathectomy is advised will depend to some extent on the facilities available for the patient s treat ment the time that the patient can afford to give to his treatment, the professional experience available and the urgency of the case

The great difficulty in assessing the results of treatment lies in the fact that the disease of which hypertension is a prominent symptom follows a varied course in different subjects So called benign hypertension may be progressive and fatal or it may remain quiescent for years or it may be quiescent with phases of activity,

drug must be stopped at once Indigestion in the early stages of treatment is

[illegible]

ance or overdosage, including myxoedema. It is said to cause thrombophlebitis, but vascular complications, both arterial and venous, are a cardinal feature of arteriosclerotic disease and there is no convincing evidence that they are more common in patients taking potassium thiocyanate

Sodium restricted diet

We owe to Allen and Sherrill (1922) the first detailed presentation of the case for the restriction of salt in the treatment of patients with essential hypertension This paper should be read by those interested in the subject because it contains a number of observations that have been forgotten, as for instance, the fact that a restricted salt intake may precipitate uraemia These authors also observed significant individual variations in response to salt restriction, that whereas 1 gramme of salt (400 milligrams of sodium) daily may be too much, in other cases 1 gramme daily must be given to prevent privation symptoms and yet may be effective therapeutically. Schemm

[illegible]

may also depend on its low fat content and low protein content, and its moderate calorie value It consists of 8–11 ounces (250–350 grammes dry weight) of rice

[illegible]

100–150 milligrams of sodium, about 5 grammes of fat and 20 grammes of protein, its calorie value is 2,000 calories Kempner advises supplementary vitamins, namely vitamin A 5,000 units, vitamin D 1,000 units, thiamine chloride 5 milligrams, riboflavine 5 milligrams, niacinamide 25 milligrams, and calcium pantothenate 2 milligrams As a matter of fact, patients may maintain their weight and

[illegible]

reasonably active life, a doctor, for instance, can continue a moderate practice It involves a rigid discipline on the part of the patient because of its monotony and

[illegible]

namely asthenia, depression, loss of appetite, nausea and constipation, it may cause impaired renal function (Schroeder and his colleagues, 1949) and should not be prescribed for patients whose renal function is already below normal. Serious

or of colour changes in the fingers or toes, or of pains or "rheumatism" in the calves or feet, should lead to careful examination of the peripheral pulses, with observation of temperature and colour changes in the skin A much more thorough overhaul, with special investigations, may be necessary for an exact diagnosis, but this simple preliminary examination should be sufficient for a provisional diagnosis of peripheral arterial disease to be made The doctor should also be able to tell from it whether his patient is suffering from vasospasm or from organic arterial obstruction, either partial or complete These three stages represent the main symptomatic groups into which such patients fall

(1) Vasospasm is a reversible condition with intermittent pallor or cyanosis of the digits precipitated by exposure to cold (2) Partial arterial insufficiency is due to organic disease of the vessel walls, with persistent colour changes, intermittent claudication, rest pain or ischaemic neuritis (3) Complete arterial insufficiency, means incipient or established gangrene.

These three stages may occur together in the same limb The degree of arterial inadequacy depends on the location and extent of the arterial obstruction, on the suddenness of its onset on the degree of spasm and on the efficiency of the collateral circulation

[illegible] a matter of immediate [illegible] ings, the therapeutic procedures which are special to each disease will be described

VASOSPASM (RAYNAUD'S PHENOMENON)

There is a vasospastic element, which produces symptoms at some stage, in many peripheral arterial diseases Raynaud's phenomenon is the presenting symptom in hereditary cold fingers, Raynaud's disease, pneumatic instrument disease, and in the vasospastic phenomena of pianists and typists It is sometimes the presenting symptom in early stages of arteriosclerosis and thromboangiitis obliterans, in sclerodactyly, lupus erythematosus, after arterial thrombosis and embolism, with cervical ribs, in rheumatoid arthritis, in periarteritis nodosa, and after local trauma

GENERAL TREATMENT

To reduce vasospasm the patient should avoid over fatigue, both physical and emotional, work under pressure should be reduced, anxieties avoided as much as possible and good sleep ensured

Cold in any form is harmful, especially putting the hands in cold water (as in washing up and peeling potatoes), paddling in cold water and sea bathing *Not only* does cold lower body temperature, but it produces reflex vasoconstriction in all peripheral arteries

A hot bath on rising in the morning is good, as the body temperature is usually at its lowest at this time

particularly in patients over 50 years of age Malignant or compound hypertension is, however, almost always progressive

In those that require treatment, conservative measures are first adopted, when

GEOFFREY EVANS

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PERIPHERAL ARTERIAL DISEASE

GENERAL INTRODUCTION

The onset of peripheral arterial disease may threaten a patient's life, more often it changes his mode of living upsetting both his activities and his rest, his work and his recreation Serious complications may be precipitated by minor accidents or infections and these may lead to the loss of a limb Advice and treatment can be of great value, and early diagnosis is essential Any complaint of coldness or numbness,

Tablets of papaverine sulphate .	2–4 gr	130–260 mg
Tablets of Priscol . . .	⅜–¾ gr.	25–50 mg
Alpha-tocopherol (Vitamin E) (Ephynal)	¾–1½ gr	50–100 mg

The author's experience favours the use of Priscol and vitamin E

Deep sleep produces sympathetic release and this provides an indication for the use of barbiturates such as Sodium Amytal, 3–6 grains (200–400 milligrams) taken at bedtime

When vas [illegible]
emergency a[illegible]
venous ethe[illegible]
Priscol, ⅓ grain (20 milligrams) or tetraethylammonium chloride (Etamon), 1½–7½ grains (100–500 milligrams)

Physiotherapy

Radiant heat and short-wave diathermy should, if used at all, be applied to the [illegible]

even local tissue death (gangrene)

Surgical Treatment

Sympathetic ganglionectomy or pre-ganglionectomy is sometimes helpful when vasospastic phenomena are severe and medical treatment has proved ineffective It lifts the burden of the normal vasomotor tone from the smaller arteries and [illegible]

when the legs are affected the second and third lumbar sympathetic ganglia are excised The technique of these operations will not be described here, but it is noted that one of the modern approaches to the stellate ganglion is through the axilla, and for lumbar sympathectomy the lateral extraperitoneal approach is now considered to be the most satisfactory and both sides can be done at one operation

PARTIAL ARTERIAL INSUFFICIENCY

Intermittent claudication, rest pain and ischaemic neuritis—the chief symptoms of partial arterial insufficiency—occur in arteriosclerosis, thromboangiitis obliterans and after arterial thrombosis and embolism This stage of organic arterial obstruction is more serious than vasospasm, but all the treatment suggested for vasospasm also applies here. Much additional advice and help can be given

General Treatment

The patient should be told in simple language the nature of his complaint, in order that he may understand how important it is for him to take care of the affected limb and protect it from injury, and so that he may understand how he can help the development of a collateral circulation by the various remedies which will be advised.

Clothing should be warm, with woollen underclothes if possible reaching down to the wrists and ankles. The temperature of the body is as important as that of the hands and feet

The living-room temperature should be kept at about 66° F. (19° C.) when possible.

Associated conditions such as iron-deficiency anaemia, subnutrition or hypothyroidism should be corrected.

A change of occupation may sometimes be required, especially in pneumatic instrument disease.

Wintering in a warm climate is seldom practicable, though for severe cases, and failure after sympathectomy, emigration to a warmer part of the world should be seriously considered.

CARE OF HANDS

Minor injuries to the hands must be avoided, and treated with respect if they occur Cracks or "chaps" on the tips of the fingers may be covered with collodion, [illegible]

[illegible] under a pair of gloves which [illegible]

is popular.

CARE OF FEET

Details dealing with care of the feet will be found on page 225

DRUGS

Tobacco smoking is best discontinued, even a few cigarettes a day may be harmful. Other members of the patient's household may have to refrain from smoking in the rooms which the patient uses

[illegible] ergot, ergotamine tartrate, ephedrine, adrenaline, [illegible]

twice or more often a day. One or other of the following drugs may also be prescribed Small doses should be given at first to test the patient's tolerance. They are given by mouth 4 times daily, after the four meals of the day, and an additional dose may be taken *in the night if the patient wakes*

Tablets of aspirin	5–10 grs	0·3–0·6 g
Tablets of nicotinic acid	¾–2¼ grs	50–150 mg.
Tablets of carbachol	1/64–1/16 gr	1–4 mg

Boots, shoes and slippers should be roomy with no projecting irregularities inside

instep supports of sponge rubber or of leather may help to support the arches of the foot and give the smaller muscles of the tarsus less work to do New shoes should be worn for only a short while each day

toes should be treated by every means, because ischaemic ulcers often start from these

Abrasions on the feet are treated with every care, if possible in bed until they are quite healed They should be cleaned with spirit, dressed twice daily and covered with a dry dressing held in place by a loose bandage or by adhesive strapping, which must not completely encircle a toe Powders are useful if the skin is dry, they should be avoided if the skin is moist or if an ulcer is present Painful ulcers need complete rest in bed and should be kept aseptic and dry, or covered with dressings moistened with normal saline solution or with Tulle Gras Anaesthetic ointments should not be used Care should be taken in the use of penicillin ointments and sulphonamide powders, because of the dangers of local allergic reactions

Epidermophyton infections between the toes are treated with Whitfield s ointment (half strength), salicylic acid and boric acid powder, or Castellani s paint (half-strength) applied daily for a week each month, bearing in mind the danger of using strong antiseptics on tissues which are ischaemic

Burns must be avoided at all costs The patient should be advised not to sit with his feet or legs in front of a fire, or on a radiator or electric heating pad, as he may

to help himself along when going out

Trusses should be examined lest they interfere with the circulation in the femoral artery

The patient's bed is warmed at night before he gets into it, and when he does so it is best to remove all hot water bottles But if, for the patient s comfort, hot bottles are left in the bed, care should be taken to wrap them up well and to keep them far

throw off his bed clothes Blankets of cellular material and sheets of flannelette (Blansheets) add to the patient's comfort

INTERMITTENT CLAUDICATION AND ITS TREATMENT

When a healthy man is walking normally the metabolites in his calf muscles are carried away by the blood stream In a man with peripheral arterial disease and with inadequate blood supply to his calf muscles, these metabolites accumulate

the collateral circulation

Tobacco smoking and vasoconstrictor drugs (*see* page 223) are forbidden Obese patients are advised as to weight reduction Diabetic patients, if not already stabilized, must be stabilized at once

Special mention must be made of the great value of oscillometry in the management of partial arterial obstruction

CARE OF THE FEET

really is Hot water above 95° F (35° C) should not be used, as scalds are easily produced in ischaemic tissues. After washing, the feet are gently dried with a soft towel and care should be taken to leave no moisture between the toes The last

of lanolin, glycerin and white Vaseline Pledgets of lamb's wool or cotton-wool are placed between the toes if these press on each other or overlap

The feet should be protected from even the slightest injury, either mechanical (such as abrasions, small cuts, bruises or pressure from ill-fitting shoes), thermal (from hot bottles or radiant-heat lamps) or chemical (from antiseptics such as iodine) When out of doors, care is taken to avoid crowds lest the feet should be knocked or trodden

the nails are softened If the patient's eyesight is poor, the nails should be cut by someone else If a toe-nail has become a little in-grown its corner may be dug out carefully Onychogryposes should be carefully sand-papered down

Corns should only be pared superficially, with aseptic precautions, and covered with a sterile dressing, no strong antiseptics (such as iodine) should be used, and corns should never be treated with caustics or with medicated corn-plasters or corn-rings A skilled chiropodist should, if possible, be employed, and he should be told about the vulnerable condition with which he is dealing. New and properly fitting shoes may be all that is needed to cure a corn

Socks and stockings should be seamless, a good fit, close-woven, soft and without darns, holes or wrinkles, they should be put on clean each day. New socks should be washed before use. Two pairs of thin socks may be better than one very thick pair. Bed-socks may be worn at night

Garters should not be worn, suspenders fixed to the shirt are used for holding up the socks Tight bandaging should be avoided

paravertebral block with 7 per cent phenol may be tried (*see* page 230) The opera tion of popliteal myoneurectomy [illegible]
heads of gastrocnemius
tried for severe claudica
cnemius claudication is
instead and the claudication distance is but little lengthened Good results follow tendo Achillis tenotomy in skilled hands This operation is a simple procedure and old age is no contra indication to it It may be done in a few seconds under thiopentone anaesthesia and a patient may be able to walk more than a mile within 48 hours of undergoing the operation

In conclusion it is reasonable to say that even the most severe claudication of the calf muscles may be improved by a combination of the use of vasodilator drugs tendo Achillis tenotomy and lumbar sympathectomy (or paravertebral block with 7 per cent phenol)

Rest Pain and its Treatment

Rest pain is a dull aching or burning pain in the legs or feet, sometimes associated with paraesthesiae, redness and sensory impairment It is usually worse at night and it may interfere seriously with sleep and general health It is often helped by raising the head of the bed 6 inches on blocks, by keeping the weight of the bed clothes off the feet with a cradle, or by keeping the legs hanging down during rest or sleep, perhaps over the side of the bed and resting on a stool, or perhaps from a comfortable armchair Keeping the legs dependent by any method may cause the feet and legs to become oedematous Steps must be taken to prevent severe or pro longed oedema because this itself impairs the blood supply, with danger of ulcera tion Rest pain is often quickly relieved by keeping the affected foot at room temperature, 66° F (19° C), while warming the hands or the rest of the body (reflex vasodilatation) Intermittent venous occlusion may sometimes relieve rest pain better than anything else If all other treatment fails the patient may beg for sympathectomy or amputation Many cases of so-called erythromelalgia published in the literature are really examples of occlusive arterial disease with red, hyper-aesthetic feet and rest pain

Ischaemic Neuritis and its Treatment

Ischaemic neuritis occurs where the proximal part of a large artery, such as the femoral or external iliac, is blocked Lack of blood supply to the larger nerves of the limb causes shooting stabbing pains down the limb, flitting at first from one part to another but becoming more continuous later The treatment is the same as for rest pain

Special Techniques for the Treatment of Partial Arterial Insufficiency

Buerger's postural exercises

The collateral circulation is promoted by Buerger's exercises, for which the following directions are given to patients With the person lying on his bed or couch the affected limb is raised 60-90 degrees above horizontal, and a note is made of the time it takes for the foot to blanch When the foot is fully blanched the person sits up with his legs over the edge of the bed, and the time the foot takes to become fully red is noted Reactionary hyperaemia is increased by methodical

until their concentration is above the level which causes a gripping cramp-like pain.

severe claudication spontaneous improvement occurs much less frequently.

In *second degree claudication* pain comes on while walking but is not severe enough to stop it

In *third degree claudication* the pain in the calf is bad enough to bring the patient to a standstill If he walks faster he is stopped sooner After a short rest he can walk again without pain, but he is stopped at the same distance as before—his claudication distance

treatment is expensive

When the diagnosis of third degree claudication is made a period of treatment at rest in bed is advised and the details of treatment already described under the headings of Vasospasm and Partial Arterial Insufficiency are instituted Rest in bed is

perform Buerger's exercises and to understand the apparatus for intermittent venous occlusion, or alternating pressures Rest in bed and carefully controlled treatment has quite often a remarkably good effect as judged by an increase of the patient's claudication distance. If the results of conservative treatment are disappointing, surgical treatment should be considered

Lumbar ganglionectomy gives good results in patients under 60 years of age, especially if the operation includes the removal of the first lumbar ganglion. When this operation is contra-indicated or refused, and in the elderly, lumbar

Alternating pressure apparatus

The Pavaex boot, an alternating negative and positive pressure apparatus is now made of convenient size and electrically driven Inside it the limb is exposed to a negative pressure of 60 millimetres of mercury for 25 seconds followed by a positive pressure of 20 millimetres of mercury for 5 seconds for 2 hours on the first day In subsequent treatment the pressure may be changed to 60 millimetres of mercury negative pressure and 40 millimetres of mercury positive pressure for 3–12 hours a day Higher pressures may be used later It helps in some cases, but its value in treatment is not yet fully accepted

Reflex vasodilatation

Electrically heated gloves on the hands, similar to those worn by airmen, are useful for producing reflex vasodilatation of the vessels of other parts of the body, especially of the legs and feet It is of most value in younger patients in whom arterial dilatation is still possible Some of the beneficial effect is due to a rise in blood temperature If electrically heated gloves are not available hot water bottles, electric pads or an electrically heated cradle may be used instead This treatment may be continued for several hours each day and is especially valuable in relieving rest pain

Intravenous ether

Anaesthetic ether is a useful vasodilator in circulatory crises of the extremities Its great value is in the relief of pain Ten millilitres are shaken up in 200 millilitres of normal saline solution and given intravenously by the drip method over an interval of 2 hours, every day for 12 days

Artificial fever with typhoid vaccine

A twice weekly intravenous injection of typhoid vaccine, sufficient to give a rise of temperature up to 102° F (39° C), has been used

SURGICAL TREATMENT

Sympathectomy

Sympathectomy may relieve the arteries and arterioles of their normal vasomotor tone when there is partial organic obstruction, just as it does in the vasospastic diseases, producing vasodilatation in such vessels of the collateral circulation as are still capable of altering their calibre It has no effect on the obstructive arterial disease itself It should be seriously considered in young and middle aged persons with partial arterial insufficiency It is generally contra indicated in persons over 60 years of age, but the decision as to whether or not this operation should be done on an elderly person depends as much on the patient's general condition as on his calendar age, definite age limits for this operation are unsatisfactory Some patients over the age of 60 years derive benefit from sympathectomy, especially if there is much rest pain Some surgeons perform a preliminary paravertebral sympathetic procaine block and only go on to sympathectomy if the result of this preliminary test is encouraging

Paravertebral block

Paravertebral block with 7 per cent phenol as used by Boyd, has proved of great value in elderly and ill patients for whom sympathectomy is contra indicated

and then both limbs are
, the leg is
ne minute
2 minutes
and is down for 2 minutes With 2 minutes in the horizontal position the whole cycle takes 6 minutes It is repeated 6 times in succession and the whole exercise is performed 2–4 times a day

The Sanders bed

The Sanders oscillating bed, which rocks up and down, electrically driven,

indefinitely Disadvantages are its cost and the fact that it is, as yet, difficult to obtain in Great Britain

Intermittent venous occlusion

Convenient electrical machines for this treatment are now made, they are simple to work and the patient himself can be taught in a few minutes how to use one A cuff similar to the arm band of a sphygmomanometer is placed round the mid thigh and the pressure in it is raised to 20 millimetres of mercury for 2 minutes, followed by 4 minutes' rest, the procedure being repeated for an hour 3 times on the first day and 6 times on the second day Those with experience of this treatment may prefer other periods for this alternating compression, but 2 minutes on and 4 minutes off is the time period which the authors have adopted as a routine After 2 days the pressure in the cuff is increased to 40 or 60 millimetres of mercury, and when the patient is under close observation and the condition is one of partial arterial insufficiency, intermittent venous occlusion may be given throughout the day, or continuously day and night for 2–3 weeks on end When pain prevents sleep at night, intermittent venous occlusion throughout the night may control it and give the patient a good night s sleep for months on end

Though used all over the world there is still some doubt as to the value of intermittent venous occlusion In the authors' experience it is certainly a help in the symptomatic treatment of some patients especially in those with rest pain interfering with sleep and with intermittent claudication It may allow a patient to postpone sympathectomy and give time for an adequate collateral circulation to develop This method of treatment is contra indicated when there is oedema of the limb

pain and allowing him to keep his leg horizontal or slightly raised Great care must be taken in using intermittent venous occlusion on patients with threatened gangrene since it may hasten arterial obstruction When first applied, it must be under the practitioner's personal supervision and the patient himself must be taught to watch the manometer It should never be used in the presence of sepsis

indications for amputation rather than for continued conservative treatment When

patient at all"

Massive gangrene (involving more than the digits) nearly always requires a major amputation, done carefully by a surgeon skilled in this work, using few sutures and no tourniquet Amputation above the knee with a 10 or 12 inch femoral stump is the operation most usually done, but a below-knee amputation (with a 5-inch tibial stump) may sometimes be satisfactory if oscillometer readings over the calf can be obtained and the skin and calf muscles bleed freely when they are cut The mortality from this below-knee operation is said by some to be lower, and after it an artificial limb is easier to fit and easier to use In elderly persons these points about an artificial limb are of less importance, because old people do not take easily to artificial limbs If gangrene is complicated by severe local infection, perhaps with anaerobic organisms such as may occur in diabetes mellitus (*see*

all active mechanical measures for improving the circulation should be avoided

SIMPLE VASOSPASM (HEREDITARY COLD FINGERS)

A healthy young person may find that his fingers or toes go white or blue and

equally in both sexes and other members of the patient's family may also suffer from "poor circulation" when they are cold

The condition is usually a minor complaint for which special treatment is not necessary *In the more severe cases simple treatment, both local and general,* may be advised on the lines already described for vasospastic conditions (*see* page 222).

RAYNAUD'S DISEASE

This somewhat rare condition was first described by Maurice Raynaud together with a number of other arterial diseases showing vasospastic phenomena The diagnosis of Raynaud's disease can only be made when the other causes of Raynaud's phenomenon (with intermittent attacks of pallor or cyanosis of the extremities) have been excluded (Hunt, 1936) Raynaud's disease proper, a definite clinical entity, occurs almost exclusively in females and begins young adult life

Preliminary treatment is on the lines already described in detail for vasospasm (*see* page 222) If conservative treatment has proved insufficient after a trial of 3–4 months (including a s
or recur so frequently
prove that there is a

the limb has been achieved,
rs) slight symptoms return

This procedure can be carried out in the out-patient department, there are few, if any, complications if it is done properly, and good sympathetic denervation is obtained in about 80 per cent of cases, though complete destruction of all the ganglia is seldom brought about.

COMPLETE ARTERIAL OBSTRUCTION WITH GANGRENE

ably possible Such drugs lower the patient's morale and are habit-forming It has been said, however, that the prognosis in cases of gangrene, especially in old people,

with a sterile powder and by leaving the foot exposed to the air at room temperature, about 66° F (19° C)

If the gangrene is deeper and involves tissues other than the skin, and if sepsis is present, wet dressings of normal saline solution, eusol or glycerin are preferred, some surgeons use Tulle Gras The dressing should be changed once or twice a day and each time dead tissues should be picked away, or cut off with strong scissors, so that discharges can escape freely and do not collect beneath a crust. The removal of this dead tissue is not painful Trypsin is sometimes useful for removing a slough Some clinics advise that the limb be kept cool, as this reduces metabolic requirements, bacterial activity and toxaemia, but below 59° F (15° C) oxyhaemoglobin does not dissociate and then the nutrition of the tissues may be worse than with no cooling at all Heat should be applied to the trunk, but under no circumstances must it be brought near the affected foot owing to the increased liability of ischaemic tissue to burns, and the risk of raising metabolism and in-

be done to improve the circulation of the limb, lumbar sympathectomy may be advised in patients under 60 years of age who are otherwise healthy, and phenol paravertebral block for the elderly and decrepit

of demarcation and the wound is usually left open, with not more than one loose stitch Some surgeons, however, prefer primary suture, after sulphathiazole insufflation, for these small amputations. The stumps of the three middle toes usually heal better than those of the first and fifth toes in which the collateral circulation comes from one side only Severe rest pain, oedema of the leg due to associated deep phlebitis, indolent cellulitis, or the need for a rapid convalescence, are usually

and adequate collateral circulation can develop even when a large artery is completely blocked

The disease proceeds by waves of activity with quiescent periods between, so that the obstructive process and the development of a collateral circulation are in the ascendancy in turn Occasionally, perhaps after several years, thromboangitis obliterans tends to burn itself out and after this no further obstructive episodes may occur It is this self-limitation which makes conservative treatment so important Even after very severe symptoms have lasted a number of years, associated perhaps with ulceration and gangrene, the disease process may quite suddenly come to an end, and the patient can then resume as normal a life as his residual disability allows

Ulceration or gangrene, especially of the digits, is common in this disease, and it often occurs as the result of trauma which can be prevented if good care is taken Like other symptoms the gangrene is usually asymmetrical, it may involve only a small area and be quite superficial, or it may be extensive and involve the whole leg, its onset and spread may be gradual, but in some cases, when a large artery becomes thrombosed, it may be catastrophic and the whole clinical picture may change in a few hours Gangrene of the toes is much more common than gangrene of the fingers, gangrene of the feet and legs occurs not infrequently, but gangrene of a whole hand is very rare indeed Superficial thrombophlebitis (especially of the saphenous veins) occurs at some stage in about one-third of the number of patients who suffer from thromboangitis obliterans, the treatment for this is dealt with under Thrombosis in Veins

General Treatment

Early diagnosis is important, both as to the nature of the disease and as to its [illegible] of the extremities can be begun at once and [illegible] ible [illegible] ling [illegible] l to [illegible] can modify its course, its active phase comes to an end in time, after variable number of waves of activity, and by persevering in treatment the residual disability will be much reduced During remissions little help may be needed—other than advice as to rest and exercise, and precautionary measures—but during the active phase careful and prolonged treatment is required Much of this treatment is on the general lines already set forth for the management of Vasospasm, Partial Arterial Insufficiency and Complete Arterial Abstraction with Gangrene

The following aspects of treatment have special reference to thromboangitis obliterans

[illegible] Disaster [illegible]

Relief of pain —Pain is often the most prominent symptom which needs treatment in the early stages it may be intermittent claudication on exercise, rest pain, the pain of *ischaemic neuritis, pain localized to the region* of the affected artery or

When this occurs patients are naturally disappointed, but the great majority say, even several years after operation, that their hands are better than they were before it After bilateral cervico-thoracic ganglionectomy patients who still have symptoms in their feet will often return to the surgeon for lumbar ganglionectomy, which relieves them even more than does the operation for their hands, and almost

obtained and after operation a typical attack can still be produced, in most cases, by adequate exposure to cold, the "local fault" in the vessel remains untouched, for on this vessel the operation has no effect

ARTERIOSCLEROSIS

Arteriosclerosis is the commonest arterial disease of the extremities The legs are affected more severely than are the arms, and it is the femoral and popliteal arteries in which the obstruction most often occurs

In general terms arteriosclerotic disease is progressive, though its activity waxes and wanes with periods of activity alternating with periods of quiescence lasting perhaps months or even years During these quiescent phases the development of a collateral circulation may overtake the obstructive process, so that spontaneous improvement takes place The possibility of such spontaneous improvement should

Habitual over fatigue, both physical and emotional (especially worry and anxiety) may aggravate arteriosclerosis and, when giving advice about management, these factors should be dealt with

Associated diseases which aggravate arteriosclerosis are diabetes mellitus, hypertension (which is found in about one-third of the cases), polycythaemia, gout and hypercholesterolaemia, and, if one of these is present, it also must be treated

General Treatment

Treatment of arteriosclerosis of the peripheral arteries is on the same lines as that already described for vasospastic states and for partial and complete arterial insufficiency (*see* pages 222 and 224)

An initial period of rest in bed for 2–3 weeks is often advisable, and certainly

large doses of analgesics may be necessary Half the cases of gangrene in arteriosclerosis can be prevented by giving

simple precautions to avoid trauma—

warmth and other measures

Amputation

With improvement in conservative treatment, amputation is not required so often now as in the past, but it is still done in about 10 per cent of cases It should be avoided if possible and a long period of conservative treatment should be given first

A gangrenous toe is better left to slough spontaneously Amputation of the toe may be needed if pain is severe, if it is important to save time, if there is no infection, if there is a pulse at the ankle, and if lumbar sympathectomy has been considered and rejected or has already been done

When the pain is very severe and cannot be controlled, so that the patient's nervous system is showing signs of strain, amputation of the leg is indicated It is better to have a patient back at work with an artificial limb than to have a man who

[illegible]

person it is also preferable to one through the thigh, because an artificial limb is easier to fix, and to use, if the knee remains Even after careful oscillometry it is sometimes extremely difficult to decide whether or not the tissues below the knee have enough blood supply to ensure good healing and often this question can only be answered when the surgeon has made his incision and has examined the blood supply of the skin and of the cut muscles

With gangrene involving a finger, amputation of the finger is sometimes required but loss of a hand is hardly ever necessary

Other surgical measures

A new operation—popliteal arteriectomy with excision of a segment of obstructed artery and substitution of a vein graft—is now being tried A "vein by pass" is a simpler modification of this, the arterial block being by passed with a *vein graft which is joined to the artery end to side above and below the obstruction*

SUDDEN COMPLETE OBSTRUCTION OF A PERIPHERAL ARTERY BY EMBOLISM OR THROMBOSIS

This catastrophe is one which may be met unexpectedly at any time It may be misdiagnosed and proper treatment delayed, which is all the more unfortunate because accurate diagnosis of arterial obstruction and prompt treatment may often save not only the limb but also the life of the patient

[illegible]

embolism and thrombosis Embolism is likely if there has been auricular [illegible] or flutter [illegible] to normal rhythm a recent coronary thrombosis or if there is [illegible] likely if there is advan[illegible] trauma (often behind the knee), local infection or a blood disease such as poly[illegible]haemia Sometimes a temporary fall in blood pressure during an acute illness, or following an

vein (this usually lasts about a fortnight) or the pain of ulceration or impending gangrene Whatever its cause severe pain indicates strict rest in bed

Protection from injuries—Protection of the extremities from injury of all sorts is of paramount importance As in arteriosclerosis gangrene when it occurs is precipitated in about half the cases by minor and avoidable injury Details of the precautions which should be taken against this are described on page 225

Skin infections—Epidermophytosis and other infections of the feet should be treated with special care because of the danger of thrombophlebitis which is so liable to develop in this condition

Physical measures—As in arteriosclerosis the choice of physical or other methods to be used for increasing the collateral circulation (postural exercises intermittent venous occlusion alternating pressures intravenous ether and the like) must be left to the physician in charge to decide Extra care must be taken with some of these methods of treatment if there is a tendency to thrombophlebitis

change of occupation may be a very serious matter for a young man who is taken ill with this complaint and a modification in his method of work may be all that is needed The same may be said of residence in a warm climate which though beneficial is more often than not impossible

main obstruction arteries in which considerable reflex spasm may be present for some hours after the original blockage occurs Their use is also indicated when thrombophlebitis is present (*see* Anticoagulant Therapy)

SURGICAL TREATMENT

Sympathectomy

Lumbar ganglionectomy for the legs and cervico thoracic or upper thoracic ganglionectomy for the arms are procedures of great value in the treatment of many cases Adequate sympathectomy does not affect the d sease process itself and it cannot open up arteries already blocked but it abolishes vasospasm and it ensures maximal dilatation of the smaller anastomotic arteries and arterioles

ulceration and incipient or superficial gangrene sympathectomy is of great value If one leg has already been amputated for this disease and symptoms are beg nning on the other side immediate sympathectomy may save the remaining limb

involved It may be repeated daily Even a spinal anaesthetic may sometimes be required when pain or spasm in the leg is at its height Sympathectomy may be needed later for residual symptoms

Embolectomy

The results of modern conservative treatment are so satisfactory that embolectomy is done less often now than it was a few years ago, but if an embolus is strongly suspected as the cause of obstruction and if no obvious improvement is taking place 4–8 hours after the onset of symptoms, this operation should be considered Though the embolus may thus be successfully removed, it has been found that thrombus formation at the arteriotomy site often causes trouble, but the chance of this secondary thrombosis is reduced by adequate anticoagulant therapy This

procedures, are referred to on page 238

FROST BITE

Frost-bite is caused by exposure to temperatures below 32° F (0° C.) and usually affects the hands, feet, nose, cheeks or ears Adverse factors increasing the likelihood of frost bite are rapid cooling of the body (as in a cold wind), immobility of the extremities (increasing venous stasis) underlying occlusive arterial disease of any sort, malnutrition, anaemia and anoxia (as in high altitude flying) All these factors may lead to the development of frost bite at a slightly higher temperature and with less exposure, than would have been needed had these adverse conditions not been present At high altitudes, with anoxia and extreme cold, exposure for even a minute or two may cause extensive and permanent damage

Prevention

Adequate warm clothing (loose and light) is essential, with a windproof outer

the danger of freezing of the moisture in expired air General care of the hands and feet is as important as it is in other conditions described in this section

General Treatment

The treatment of frost bite depends on its severity, the degrees of which are comparable with the different degrees of burns

The first degree of frost bite shows pale yellowish patches of the frozen outer layer of skin, with stiffness, numbness and itching If it is the face which is frozen, the affected part should be covered by a hand if it is the hand, it should be put inside the clothing if a foot, it should be put against someone else's warm skin inside their clothing Rubbing with snow or without it, is wrong and no local warmth above body temperature should be applied The body itself should be warmed and hot drinks given Alcohol is a help so long as the body can be heated If no heat is available alcohol should on no account be given, as it tends to lower body tempera

determining or precipitat-

After acute symptoms ... ry may take place, or gangrene may develop

GENERAL TREATMENT

importance because prolonged ischaemia

temperature of the room ...

In the management of these cases it may be necessary for the ... h ... for many hours to supervise personally every detail of treatment ... by sympathetic release, ... s and barbiturates for ... ct Papaverine hydro-

... diagnosis has been made. ... -weight should be given ... 24 hours It acts at once ... eparin may be continued ... 200-250 milligrams) may ... milligrams is given on the ... second or

slowly than heparin and its effect ... y very careful daily control of the prothrombin index is essential The aim should ... about 30 per cent of normal If bleeding

Too much dicoumarol will require ... blood transfusion In 24 or 48 hours the physician can usually ... to be saved In those ... be stopped as soon ... prothrombin level

time to return to normal before ...

SURGICAL TREATMENT

Paravertebral block

Paravertebral procaine block round the lumbar sympathetic ganglia is advised when a leg is affected, or round the cervico-thoracic ganglia when an arm is

the arteries and nerves, with secondary effects from reactionary oedema In trenches during winter warfare feet may be soaked and cold for days on end and during all this time boots may never
equivalent of trench-foot)
in cold water such as in ar
dinghy after an aircraft crash into the sea, especially if the legs are hanging down and immobile

The feet first feel numb and may be pale or cyanosed, later they become painful, and when examined at this stage they may be red and swollen, with perhaps

stained blisters may get larger, ulceration may spread and gangrene may develop with, perhaps, additional infection and thrombophlebitis.

PREVENTION OF TRENCH-FOOT

On active army service in cold weather the prevention of trench-foot is of the greatest importance and it depends much on the discipline of the unit The body should be kept as warm as possible and boots should be waterproof and loosely fitting, with plenty of room inside for thick woollen socks and soft felt replaceable insoles Socks which get wet should, if at all possible, be changed frequently and an effort should be made to carry a spare pair Nothing tight should be worn round the legs The feet should not be kept dependent for too long at a time, standing for long in mud and water should be avoided just as much as circumstances permit, and simple exercises to the legs and feet are beneficial Boots should be removed, if practicable, at least once a day and the feet cleaned and dried Trauma to the feet must be avoided in every way

PREVENTION OF IMMERSION-FOOT

When a ship or an aircraft has to be abandoned at sea, every effort should be made by the survivors to take some warm clothing with them, with some sort of waterproof covering, two or more pairs of thick socks, a pair of thick shoes or boots and some grease or Vaseline for rubbing on the feet. These precautions are obviously often impossible as in many cases survivors have to be picked up out of the sea An effort should be made to keep the bottom of the boat or rubber dinghy dry and, as far as is reasonable, to avoid a cramped position and keeping the legs hanging down for too long at a time In cold weather the upper part of the body should be kept as dry and as warm as possible Alcohol, such as brandy or whisky, is best avoided, it may increase the peripheral circulation a little and for a while the patient may feel warmer, but the vasodilating effect means more rapid cooling of the body as a whole and, especially in a cold wind, the final result can only be detrimental

TREATMENT OF TRENCH-FOOT AND IMMERSION FOOT

During removal from a cold trench or during rescue from an open boat, special care should be taken to see that the feet and legs are not knocked or injured in any

cold may persist for many months

The second degree, with blistering and peeling of the outer layers of the skin, needs the same treatment together with removal of the blisters and adequate aseptic precautions

The third degree (with death of all the layers of the skin and involvement of subcutaneous tissue followed by ulcer formation) and *the fourth degree* (involving

It is generally agreed that direct heating is bad owing to the great liability of ischaemic tissue to burns Greene (1942) and others have recommended that the limb be kept cold, at 35° F–41° F (2° C–5° C), to reduce local metabolism, but Lewis (1936) showed that below 50° F (10° C) blood will not part with its

few hours

The Haldane paradox

One other interesting point may be mentioned in connexion with the treatment of severe frost-bite, an observation which may be referred to as "Haldane's paradox" as he was one of the first to recognize its importance (1912) When a man suffering from severe cold and exposure is rescued, after lying out in the mountains or in the snow, the surest way to kill him, if he is already nearly dead, is to put him into a hot bath The skin and all the superficial tissues of the body are very cold, a hot bath dilates the superficial vessels, increases the blood flow through these cold tissues and lowers the blood temperature for some considerable time Hot drinks or enemas and a gradual warming of the body is the correct treatment, the warmth being applied by radiant heat or warm-water bottles to whatever part of the body is the least frozen, usually the front of the chest or abdomen The cold or frozen limbs should be kept at room temperature and allowed to warm up by themselves as the blood temperature rises

SURGICAL TREATMENT

Amputation should never be hurried, and it is always well to remember that in

TRENCH-FOOT AND IMMERSION-FOOT

Severe exposure of the feet to cold and dampness is rare in Great Britain, except during war time For the development of trench-foot or immersion-foot the exposure must be fairly long—from 2 to 7 days—and the condition is more likely to develop when the feet are immobile than when they are exercised The changes are due to the direct action of cold upon all the tissues of the feet, especially upon

first ribs give rise to no symptoms, only about one in five patients with cervical ribs have *symptoms severe enough to require treatment*

General Treatment

For conservative treatment an attempt should be made to reduce the pressure on *the lower trunk of the brachial plexus* and on the subclavian artery, by the patient's own efforts Women should not carry heavy parcels and pails, men should avoid carrying suitcases and heavy overcoats and strenuous exercise such as digging should be reduced to a minimum Sometimes relief *can be found by sleeping at night with* the arms above the head Exercises and faradism to the shoulder muscles are useful A fat patient should reduce his weight Analgesic drugs and local heat may be needed

Surgical Treatment

In those patients in whom symptoms are not relieved by conservative measures surgical decompression is required An exploratory operation should be done through an adequate incision, without preconceived ideas as to what shall be divided A fibrous band may have to be cut, a cervical rib or an abnormal first rib removed If the scalenus anticus muscle is thought to be a possible source of pressure on the neurovascular bundle, or when its insertion is unduly wide a scalenotomy should be done If no adequate cause for the symptoms is found, re section of part of the first rib, where the neurovascular bundle crosses it, may give relief *If vasospasm (Raynaud s phenomenon) is a major feature in the clinical* picture ganglionectomy as well as the decompression may be advisable

The Hyper Abduction Syndrome

and give rise to vascular and nervous symptoms very like those described above, even gangrene has been known to occur The most important part of treatment is

of the arm in an unconscious patient on an

a breast (when the

osition is *found to* interfere with the volume of the radial pulse

PERIARTERITIS NODOSA

Periarteritis nodosa is a disease of the smaller arteries and arterioles which may affect any organ of the body at any age, some cases are known to develop after

therapy The diag

completely

Treatment is entirely symptomatic and depends on what part of the body happens to be involved

ACROCYANOSIS

Acrocyanosis is characterized by persistent colour changes in the hands and sometimes in the feet of women, starting usually at puberty and lasting many years

all heat above 70° F. (21° C.) and strong antiseptics Special care must be taken to avoid pressure, especially on the heels The skin should be covered with a sterile towel and kept bacteriologically clean Ruptured blebs can be dusted with sulphathiazole powder or covered with a simple ointment Pain must be relieved by analgesic drugs and fairly large doses of these may be needed at first Treatment of incipient gangrene, or gangrene itself, with or without secondary infection, is on the lines (chemotherapeutic and otherwise) which have previously been described, but it is always well to remember in dealing with both trench-foot and immersion-

especially if excessive sweating of the feet is troublesome.

PRESSURE AT THE CERVICO-BRACHIAL JUNCTION

Many anatomical structures at the root of the neck may press on the arteries and

stretching or angulation of the neurovascular bundle The presence of a cervical rib, a rudimentary or deformed first rib, a fibrous band, or an abnormal disposition of the scaleni muscles, may aggravate this stretching and angulation or even press directly on the neurovascular bundle itself The so-called "scalenus anticus syndrome", in which the scalenus anticus muscle is said to be the sole provocative factor, is now believed to be a rarity Clinically, it may be difficult, and often impossible, to tell exactly which structures or combination of factors are at fault, and not until operation, when the brachial plexus and the third part of the subclavian artery are thoroughly exposed and inspected, with the shoulder being moved about under the anaesthetic, can an exact diagnosis often be made

Many of the symptoms are due to nerve involvement giving rise to pain and paraesthesiae down the arm, but it is the vascular phenomena with which we are concerned Not infrequently there is a mixture of nervous and vascular symptoms. The syndrome is more common in women than in men, it causes intermittent

detected clinically Ischaemia of the whole arm may be present when there is thrombosis of the third part of the subclavian artery and nutritional changes in the

first thoracic rib It must be remembered that many cervical ribs and abnormal

Hedley J B Atkins, A Lawrence Abel, Wilfrid G Oakley, Professor Sir J Paterson Ross, R. Bodley Scott, Raymond Greene, Professor E D Telford, and Edward G Tuckwell

JOHN HUNT
GEOFFREY EVANS

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PERIPHERAL CIRCULATORY FAILURE

INCLUDING "SHOCK" AND "SYNCOPE"

DEFINITION AND DESCRIPTION

The terms used in the main and subtitles of this section need definition because various writers have used them with quite different meanings

causation arises in two main ways

(1) By absolute reduction of circulating blood volume due to haemorrhage, plasma loss, or loss of plasma water and electrolytes in dehydration This may be called *oligaemic peripheral circulatory failure*

(2) By relative reduction of circulating blood volume due to pooling of a significant fraction of it in some part of the vascular bed This may be termed *vasodilatory peripheral circulatory failure*

In both conditions there is decreased return of blood to the heart, with consequent fall in the cardiac output, but the heart is not primarily at fault

The oligaemic type is the more serious and is often fatal Nevertheless, if treatment is not too long delayed, the oligaemic condition responds remarkably to restoration of the blood volume by the introduction of appropriate fluids

The vasodilatory type of peripheral failure is usually of brief duration and seldom dangerous, except when superimposed on the oligaemic type However, its clinical manifestations are often much more dramatic because a frequent feature is sudden loss of consciousness from cerebral anaemia

The terms "shock" and "syncope" are perhaps better avoided because their meanings have become so imprecise from different usage Roughly speaking, ... writers have ... nple follow- ... *secondary* ... een used in many senses but most often to mean sudden loss of consciousness due to cerebral anaemia This most frequently arises from sudden vasodilatation but may be due to cardiac standstill (Adams-Stokes syndrome)

There may be a family history of similar trouble The hands are a different colour from normal even at an ordinary temperature, when warm they are persistently pink and when hot, bright red, when cold they are deeply cyanosed and when very cold they may be purple and numb They are often embarrassingly moist Chilblains are common

Treatment consists in protection from cold, and is on the lines advised for vasospasm (*see* page 222) A very severe case is an indication for sympathectomy, especially if chilblains are bad The results of the operation in acrocyanosis are about as good as they are in Raynaud's disease

GLOMUS TUMOUR (GLOMANGIOMA)

Glomus tumours arise from the structure of the peripheral arteriovenous anastomoses, an overgrowth of the normal cutaneous glomus They are found on the hands (often under the nails), feet, penis and perhaps elsewhere, and usually occur in young adults There is a history of trauma in about half the cases

Pain is the first symptom and this usually precedes the visible swelling which develops as a small bluish purplish, extremely tender nodule seldom larger than a few millimetres in diameter Often both patient and physician find it hard to believe that such a small lesion can cause such exquisite pain, and one of the first steps in treatment is to convince the patient that this is so, this may be quite

surgical removal, under a local anaesthetic, can be undertaken Before this removal, the patient should be warned that immediate relief may not follow the operation, and that several weeks may elapse before the pain disappears altogether At the time of the operation care should be taken that the small swelling is not emptied of blood when the local anaesthetic is injected, because if this happens it may be extremely difficult to find For subungual glomus tumours a considerable part of the nail may have to be removed to give an adequate exposure A histological section should be done to confirm the diagnosis Radiation therapy is not successful in the treatment of glomus tumour Amputation of a digit should never be needed

TEMPORAL ARTERITIS

Temporal arteritis is a localized inflammation or spasm of the temporal artery giving rise to headache, generally in an old person, with pain and tenderness along the course of this vessel in the scalp It is usually part of a generalized arterial disease

Treatment is symptomatic If a hat is worn it must be loose fitting Surgical excision of the affected artery is usually unnecessary, but in severe cases it may stop the pain dramatically

ACKNOWLEDGEMENTS

During the preparation of this section many disputed points have been discussed with other workers We should like to acknowledge, with grateful thanks, personal communications and help from Professor A Michael Boyd, A Dickson Wright,

show parallel deterioration There is usually, but not invariably, quickening of the heart rate The veins are empty and in spasm—which *may offer considerable* resistance to the entry of transfusion fluids

The ch [illegible]
hunger [illegible]
usual and [illegible]

VASODILATORY PERIPHERAL CIRCULATORY FAILURE

In this type of circulatory failure there is pooling of blood in some part of the vascular bed Occasionally such pooling results from obstruction to the venous return from an extensive capillary area while arterial inflow remains unimpeded If venous tourniquets are placed on both thighs and on one arm, for 10 minutes, about 15 per cent of the total blood volume becomes trapped in the limbs in addition to their normal blood content Strangulation of intestinal loops may lead to considerable blood trapping, followed by plasma oozing from the loop into the peritoneum, in addition, the sudden rise in intra-abdominal pressure causes some trapping of blood in the legs which also occurs with sudden thrombosis of the inferior vena cava

In the vast majority of instances, however, vasodilatory peripheral failure is not due to venous obstruction but to loss of tone and consequent dilatation of a considerable part of the vascular bed, especially the vessels of skeletal muscles and probably of the splanchnic area *In most cases the pooling is sudden* and, therefore, often most dramatic The temporary inhibition of vasomotor tone prevents the vasoconstrictive compensation which occurs in actual blood loss Consequently, *cerebral circulation is not maintained and abrupt fainting or near-fainting is* frequent Fortunately, loss of tone is usually only a matter of moments or minutes and recovery is generally rapid

The causes of the vasodilatation may be as follows

Psychogenic or neurogenic reflex vasodilatation

This is by far the commonest cause of vasodilatory peripheral failure and is of frequent occurrence as ordinary faintness or fainting Precipitating psychogenic causes are experiences evoking strong emotions, particularly fear and disgust *Many instances are seen in* patients undergoing inoculations or minor surgical operations, or in blood donors volunteering for the first time Nasty, sickening sights, especially when involving injuries to human beings or animals, disgusting *smells and frightening sounds may* all produce this type of temporary peripheral failure Neurotic individuals are notoriously prone and, in them, preliminary hyperventilation sometimes plays a part.

Precipitating neurogenic stimuli are severe pain and particularly sickening pain arising from such areas as the solar plexus, nail beds or testicles In certain individuals, pressure on one or both carotid sinuses may cause vasodilatory failure In *anaesthetized patients traction on the mesentery* may momentarily cause the condition

Frequently there is associated bradycardia and it would seem that there is *temporary excess of vagal tone Hence* fainting attacks of this type are often called vaso-vagal attacks

OLIGAEMIC PERIPHERAL CIRCULATORY FAILURE

Blood volume may be reduced in the following ways (1) By loss of whole blood from haemorrhage of which the many causes hardly need enumeration Bleeding peptic ulcers are the commonest medical cause

(2) By loss of whole plasma by leakage, into tissues or from surfaces, through [illegible]

[illegible] toneal exudates)

(3) By loss of plasma water and electrolytes, in dehydration of the secondary [illegible]

tends to diminish the elastic pressure of the vessels on the contained blood In particular, venous pressure tends to fall with consequent decrease in return of blood to the heart and drop in the cardiac output

The fall in venous pressure and cardiac output is followed by an immediate vasoconstrictive vascular response which shuts down blood flow in relatively non-essential areas so that adequate circulation is maintained in the nervous system, coronary circulation and in other absolutely vital organs

The widespread vasoconstriction affects arterioles, capillaries venules and veins It raises the peripheral resistance and, for a time, the blood pressure is restored and may even rise slightly Occasionally, the compensation is so effective that the blood pressure has not fallen even when blood volume loss has reached 30 per cent Usually, however, it begins to fall when loss exceeds 15 per cent and thereafter declines parallel with further loss Death occurs when the blood volume reduction is of the order of 40–50 per cent This means a loss of 4–5 pints, or more than 2 litres, in average men in whom total blood volume is approximately 10 pints or 5½ litres (British Imperial pint = 0 57 litre, U S A standard pint = 0 47 litre)

Clinical Features

The clinical manifestations are chiefly determined by the vasoconstrictive reaction The bloodless skin is pale and cold especially in the extremities It may be moist with cold sweat There may be cyanosis of the lips ears and nails

The extreme depression of the peripheral circulation causes analgesia so that patients with severe injuries may make little complaint of pain until blood volume and circulation are restored Such insensibility should be interpreted as a danger signal, it also renders the patient very liable to burns from hot water bottles

Because of the maintained cerebral circulation the mind may be clear almost to the moment of death and the patient may seem mentally normal or may be unduly talkative, euphoric or restless This feature may be very dangerously misleading It is particularly seen following acute haemorrhage or plasma loss, the slowly developing oligaemia of secondary dehydration more often results in stupor and mental confusion

Arterial blood pressure is at first maintained or even raised but later falls and ultimately becomes unrecordable The force, tension and volume of the pulse

The patient's main sensations are of faintness and nausea which come on suddenly and intensify quickly Giddiness may compel him to sit down or lie down and he may vomit He looks pale or "green" and the skin is often bathed in clammy sweat The pulse is weak or impalpable and the blood pressure low or unrecordable The heart rate may be normal or fast, but *is often abnormally slow Yawning and over-*breathing are among occasional manifestations

In many cases consciousness is not lost and recovery occurs after lying down for a few minutes In other cases, faintness is followed in a few moments or minutes by actual fainting Sometimes fainting occurs so abruptly that the patient may fall unconscious without any premonitory phase

The duration of unconsciousness is usually less than two minutes but it may

for periods varying from a few minutes to a few hours

TREATMENT

Association of Oligaemic and Vasodilatory Failure

However, in all oligaemic cases, such as patients suffering from bleeding, burns or dehydration, episodes of vasodilatory failure may precede or subsequently *complicate the oligaemic failure*

Men injured in battle or in accidents may show no symptoms until continuous bleeding has caused oligaemia, but many patients collapse within a few minutes of injury from psychogenic or neurogenic vasodilatory failure Recovery ensues rapidly but, a few hours later, oligaemic failure develops It was this sequence of events which led to the old terms "primary shock" and "secondary shock"—unfortunate labels because there may be no primary shock or it may follow secondary shock

The complication of already developed oligaemic failure by a phase or phases of vasodilatory failure is common and of the utmost importance because sudden death may result In its simple form vasodilatory failure is dramatic but not dangerous Nevertheless, it may be lethal in oligaemic patients who are only surviving because of the vasoconstrictive compensatory mechanism

The occurrence in oligaemic patients of these dangerous episodes of vasodilatory circulatory collapse may be spontaneous and due to no apparent reason

because of psycho-

or from the use of

ation of excessive

Gravitational pooling

lysis, makes them flaccid reservoirs Certain rare individuals, when in their usual state of health, suffer from orthostatic fainting due to defective antigravity vasomotor reflex responses (postural hypotension)

Prolonged standing diverts blood into the dependent parts and may cause fainting in normal persons for example soldiers on parade, a larger volume accumulates in those who have varicose veins

An exceptional example of gravitational pooling is black out, or amaurosis fugax, due to the effect of centrifugal force on aviators pulling out of dives or making close turns, at high speeds

Over heating of the body

This causes generalized vasodilatation especially in surface vessels The pooling may be sufficient to cause temporary circulatory failure, a familiar example is fainting after too hot a bath

Vasodilator drugs

Alcohol causes marked vasodilatation This effect does not greatly matter in unwounded or healthy individuals but it may result in death of patients suffering from haemorrhagic oligaemia because of interference with the vasoconstrictive compensatory response The nitrites (amyl nitrite, sodium nitrite glyceryl trinitrate) cause vasodilatation by direct action on the blood vessels If dosage is excessive, the subject may faint from cerebral anaemia due to gravitational pooling in the relaxed vascular bed

Spinal anaesthesia or sudden high spinal cord lesions

These may produce widespread vasodilatation, and consequent fall of blood pressure from interruption of sympathetic pathways and abolition of sympathetic tone

Severe acute infections

Acute infections may sometimes cause circulatory failure which appears possibly to be due to widespread peripheral pooling due to loss of vascular tone but the subject is still obscure

Toxic or anaphylactoid shock

Shock caused by foreign proteins is possibly another example of vasodilatory blood pooling with an added factor of increased capillary permeability and plasma extravasation

Clinical Features

The outstanding clinical characteristics of vasodilatory failure are rapid onset and domination of the clinical picture by symptoms due to cerebral anaemia

patient is simple covering with sufficient blankets to prevent chilling Hot cradles should never be used as they are far too dangerous Hot water bottles sho also be avoided for in oligaemic failure they may easily cause severe burns beca

It is proposed now to describe the treatment for oligaemic failure and then mention in connexion with vasodilatory failure a few measures indicated in espe ally stubborn cases

OLIGAEMIC PERIPHERAL FAILURE

The commonest form of oligaemic failure is that due to secondary dehydratio Its treatment is fully described in the chapter on dehydration to which referen should be made (*see* page 526) In passing, it is well to emphasize that many patien suffering from oligaemic failure, primarily due to haemorrhage or plasma loss, a also suffering from dehydration and the dehydration component may be increasi the oligaemia This was particularly true of battle casualties in hot regions. Oft their dehydration was more responsible for their shock than was the actual bloo loss In all cases of oligaemic failure consideration should be given to the questio of whether or not the patient is dehydrated, in addition to whatever else is th matter with him

Preventive treatment

The prevention of haemorrhage, plasma loss or dehydration is often not possibl Nevertheless, in many cases the operation of these causes of blood volume reduc tion can be avoided by intelligent anticipation

Haemorrhage —When it is known that haemorrhage is likely to occur or con tinue, the consequences of it may be avoided by continuous drip blood transfusion For example, patients suffering from bleeding peptic ulcers should not be allowe to lapse into oligaemic failure This, in almost all cases, is easily avoidable if a dri blood transfusion is set up at an early stage and a sufficient supply of blood i obtained As a result of careful watch on the patient, blood may be run in so as t prevent severe oligaemia Such cases are typical of the problem presented b haemorrhage from an unsecured bleeding point It is quite a different problem fron the treatment of patients who have suffered bleeding from a vessel which has bee ... the blood volume ...ked oligaemia bu ... that soon

...partly a local matter but also partly due to the generalized vaso... ...of

vasodilatory failure These measures should form the immediate emergency treatment of every case and should be maintained until all danger has passed

IMMEDIATE TREATMENT FOR ALL CASES OF PERIPHERAL FAILURE

These measures, of common value in both forms of peripheral failure, are applicable for preventive and remedial treatment They are simple and "first-aid" in character but their importance is, none the less, very great They are (1) the recumbent posture with the head low, (2) reassurance, (3) relief of pain, and (4) warmth, in many cases

Recumbent posture with head low

It is very important that all patients should lie flat and that the foot of the couch or bed should be raised 8–12 inches This simple measure will do more to preserve

patients being allowed to sit up suddenly or even to get out of bed

Reassurance

rhage from any cause or plasma loss from the dramatic conditions which produce it, are often understand

their being brought to

going to be done to the

specific direction, ensure that everyone in contact with the patient shall maintain an attitude of "there's nothing to worry about you'll soon be all right" Proffering a cigarette or a cup of tea can be of remarkable value in the restoration of confidence

Relief of pain

Patients in pain should be given morphine, $\frac{1}{4}$ grain or $\frac{1}{3}$ grain subcutaneously If marked oligaemic failure is present, the peripheral circulation may be so depressed that absorption is very retarded In such cases $\frac{1}{8}$ grain or $\frac{1}{6}$ grain may be given, very slowly, intravenously It is unwise to repeat morphine administration, unless pain is very severe, until at least 4 hours have elapsed

Warmth

Warmth is valuable for chilled patients but *it is most important not to overdo* heating This was a common error in the past The danger lies particularly in

BRAIN

ABSCESS

HISTORICAL

Prior to the introduction of the sulphonamides and penicillin, the mortality rate from brain abscess remained high despite improvement in surgical technique. A notable exception was the remarkable series of 21 operations for brain abscess with 18 recoveries, reported by Macewen in 1893. With the aid of antibiotics the neurosurgeon of today may attain the low mortality rate recorded by Macewen.

AETIOLOGY

A brain abscess may develop either as a result of spread from a neighbouring focus of infection or as a result of metastasis from a distant focus. With regard to the first group, the abscess may be intracerebral, subdural or extradural and may result either from a retrograde thrombophlebitis or by direct spread from infected bone. *The commonest cause within the skull is an infection of the mastoid cells re-* [illegible] in the cerebellum. An [illegible]

amongst the other causes of pyaemia which may be complicated by a brain abscess

DIAGNOSIS AND TREATMENT

Successful treatment of brain abscess largely depends on two factors: accurate [illegible] of infection in [illegible] istory [illegible] the finding of a defect in the opposite upper temporal quadrant would indicate a temporal lobe abscess. Redness, swelling and tenderness of the forehead in a patient with cerebral symptoms should suggest the probability of a subdural or frontal lobe abscess secondary to an empyema of the frontal sinus. When the source of infection is remote an abscess may easily be overlooked unless inquiry is made [illegible] cerebro- [illegible] increase [illegible] ned the [illegible] amination, but in other cases electroencephalography, ventriculography or angiography will be necessary.

T[illegible] has enabled the neurosurgeon to postpone radical [illegible] s may [illegible] of infection in the meninges and within the brain, and secondly to combating any rise in intracranial pressure which may result from oedema around the abscess. The first [illegible]

any danger at all and some would hold that bleeding actually tends to stop when such transfusion is being administered The problem has been discussed by Avery Jones (1947)

Plasma loss—The prevention of plasma loss is, of course, often not feasible However, there are occasions when such prevention may be attempted Ischaemic

loss from areas rendered ischaemic by crush injuries may be prevented by the

48 hours

The prevention of plasma loss due to capillary injuries by organisms is, naturally, a matter of combating the infection in such conditions as extensive cellulitis lobar pneumonia, and massive pleural and peritoneal exudates The specific treatment of these conditions does not lie within the compass of this chapter

Dehydration—The preventive treatment of dehydration is fully discussed in the chapter on dehydration (*see* page 526) It is, of course a matter of the very greatest importance in all cases of oligaemic failure

Remedial treatment

The remedial treatment of oligaemic failure consists essentially in the earliest possible restoration of the blood volume There is no need for discussion of the indications for such treatment It is enough to say that any patient who is showing symptoms due to oligaemic failure is in need of blood volume restoration Such restoration should be effected without delay The time factor is of enormous importance It is not possible to over-emphasize the need for prompt treatment If patients are left too long in oligaemic failure the state may become irreversible This means that the condition does not respond to adequate restoration of blood volume The patients remain in a condition of collapse and soon die The exact pathology of irreversible oligaemic failure is still in doubt.

As a general principle, the deficit of blood volume should be made up by the introduction of whatever is lacking Therefore in cases suffering essentially from haemorrhage, the transfusion of whole blood is indicated In patients suffering from plasma loss, plasma is the appropriate fluid In patients suffering from oligaemic dehydration there is need for the administration of water and salt

Since the treatment of dehydration is discussed in a special section it is only necessary here to deal with the principles of administration of whole blood and plasma For details of blood transfusion, together with such technical matters as the preparation of plasma, the grouping and bleeding of blood donors and the methods of administering blood or plasma, the reader is referred to Dr. H F.

closed head injury is often at the pole opposite to the point of application of the force ("contrecoup" effect) For example, a blow on the back of the head may lead to a maximal degree of contusion and haemorrhage in the frontal lobes Death may occur from primary or secondary changes in the brain stem However, the majority of patients survive and make a complete recovery In a small proportion certain sequelae remain which may be accounted for by localized areas of demyelination or gliosis secondary to local softening The clinical picture varies according to the degree of contusion In mild or moderately severe cases the stage of complete unconsciousness exceeds an hour, and is followed by a state of stupor, during which the patient responds to painful stimuli This condition may last for some hours, it may be succeeded or replaced by a *traumatic delirium, and there may be incon*tinence of urine Complete recovery is the rule The majority of cases of cerebral contusion fall into this group

When the injury to the brain is more severe, coma succeeds the stage of shock, either directly or following a period of semi-coma The reflexes show changes

[illegible]

may persist for several days or weeks Recovery may be complete or partial On the other hand, coma, instead of lessening, may gradually or quickly deepen, as is shown by progressive diminution in reflex function The pupils become dilated and react more and more sluggishly to light, Cheyne Stokes respiration sets in, the temperature and the pulse rate progressively rise and death takes place

CEREBRAL HAEMORRHAGE

Cerebral haemorrhage may be extradural, usually from a fracture involving the middle meningeal artery, or subdural (acute, subacute and chronic forms) from

[illegible]

The diag[illegible]
no period during which coma lessens, but in the majority of cases a temporary return of consciousness is followed by semi-coma, deepening coma and focal signs, as in an extradural haemorrhage In other cases coma, after lessening, again becomes deeper The chronic form of subdural haematoma may follow a comparatively mild or a severe head injury Recovery appears complete or nearly [illegible] months or even a year or more during which time all memory [illegible] ollowed by mental changes, [illegible] tation of a pupil, pyramidal signs (homolateral or contralateral), papilloedema and death unless the condition is recognized and promptly treated by surgery

DETERMINATION OF DEGREE OF CONSCIOUSNESS

Clouding of consciousness is the most consistent sign of injury to the brain, and changes in the level of consciousness are the most delicate index of improvement or

cerebrum or cerebellum, its total removal may be possible However, in certain cases extirpation of the abscess may be impracticable owing to its situation or it may be deemed unnecessary, in which case repeated aspiration and the local use of penicillin may suffice for a cure

Whenever possible the primary focus of infection should be dealt with Since the vast majority of cerebral abscesses secondary to infection within the skull lie in the

should be given for 1 or 2 years

Macewen W (1893) *Pyogenic Infective Diseases of the Brain and Spinal Cord* Glasgow, Maclehose

INJURIES

given

MAIN TYPES OF HEAD INJURY

There are three main types of injury to the head These are concussion, contusion, and haemorrhage

Concussion

In a case of concussion there is a widespread paralysis of the function of the brain Recent work suggests that damage to neurones occurs, which, however, is reversible The duration of unconsciousness varies from a few seconds to an hour or more In severe cases there are pallor, dilatation of the pupils, absence of reflexes, shallow respiration and a feeble pulse Retrograde amnesia (R.A) and post traumatic amnesia (P T A) are of short duration, headache may be present for a few days, and recovery is complete.

Cerebral Contusion

there may be laceration of the surface of the brain The major effect of a severe

Notes

In the case of an acute head injury accurate notes should be made at 2 hourly intervals during the daytime They should be concerned mainly with changes in the level of consciousness and with inequality of the pupils and of the deep reflexes Pulse and respiration should be recorded hourly, and the temperature should be taken and noted every 2 hours The *nursing staff must report any change in consciousness*, any change in the size of the pupils, spontaneous movements and any twitching or convulsive movements with their distribution

Surgery

It is the exceptional case of head injury that requires surgery, but if the need arises the services of a neurosurgeon should be obtained if possible, provided delay does not endanger the patient's life

Convalescence

The period of recovery from a head injury can be shortened or prolonged, depending on the standard of treatment during convalescence and on the attitude of the medical and nursing staffs towards the patient

TREATMENT

The Acute Phase

The acute phase is considered as the time from admission to hospital until signs of improvement are apparent

In the casualty department the following points should be noted the degree of shock, the state of consciousness, bleeding or escape of cerebrospinal fluid from ears or nose, abrasions, haematoma, depressed fracture, bleeding into conjunctivae and eyelids, and evidence of focal damage to the brain, as shown by inequality of the abdominal reflexes and of the deep reflexes and a unilateral extensor plantar response

When the patient is admitted to the ward, shock, if present, should be treated by warmth, absolute quiet and the provision of a dull light As soon as the shock has passed off and during the remainder of the acute phase, *attention should be* paid to the following points

Position of patient

The semi prone position is best (that is, half turned on to the face), the head on one *pillow and the mouth* kept low so as to facilitate escape of saliva and blood, thereby lessening the risk of an inhalation pneumonia A sucker may be necessary in addition to these measures

Bladder and bowels

... treated by catheterization since a full bladder is a
...w No effort *to move*
the use of an enema

... It is not enough to describe a patient as "unconscious", an attempt ... [illegible] ...owing terms should be

COMA

[illegible]

to light and all other reflex activity is much depressed or abolished The limbs are flaccid and the plantar responses are extensor

SEMI-COMA

The patient in a semi-coma does not respond to a shouted command, but when pinched grimaces or moves a limb The pupils react to light The reflexes mentioned above are brisk The deep reflexes are within normal limits and the plantar responses are flexor

MENTAL CONFUSION

Every patient with head injury goes through a stage of mental confusion which may be mild and transient or severe and prolonged, according to the degree of damage to the brain The condition may last minutes, days or weeks, and is followed by amnesia for that period

Severe confusion

The patient in this condition may respond to commands such as "put out your tongue", or "take my hand", but is otherwise inaccessible and completely disorientated In this state he may confabulate (Korsakoff's psychosis) Other features of severe confusion which commonly occur are delirium characterized by restlessness, a confused flow of talk and, at times, hallucinations, and stupor, in which the patient, unless roused, remains inactive and takes no interest in his surroundings

Mild confusion

When in a condition of mild confusion, the patient may be able to give details of his family and of his work, but he is slow in thought and may be inaccurate when questioned on everday incidents or topics

GENERAL MANAGEMENT OF A CASE OF HEAD INJURY

Successful management depends on a carefully recorded history, accurate notes, a good standard of surgery (when surgery is indicated) and correct treatment during convalescence

HISTORY

As a rule the history of the case can be obtained only from witnesses of the accident It should include the time of the accident, the manner in which it occurred, and any facts bearing on the state of consciousness of the patient before admission

Hyperthermia

[illegible]

up

Restlessness

[illegible]

[illegible] restlessness is marked and a drip has been set up, 10 millilitres of paraldehyde should be poured into the rubber drip tube at a rate of 1 millilitre per minute This will cause coughing Another 10 millilitres of the drug are then mixed [illegible]

[illegible]

$\frac{1}{6}$ grain (10 milligrams) may be given by hypodermic injection if paraldehyde is not available

Prophylactic chemotherapy

When there is a risk of meningitis, as in cerebrospinal rhinorrhoea, Sulphamezathine or sulphadiazine should be given in adequate doses

THE PHASE OF RECOVERY

The early stage

Clinical investigations—As soon as mental confusion lessens, a fuller neurological examination will be possible When the patient returns to consciousness, smell, vision and hearing should be examined and the results noted

Lumbar puncture—Lumbar puncture should be carried out as a routine measure in all cases of head injury, except in mild cases of concussion It can be safely performed when the stage of shock is over, but if the patient is improving it should be deferred until the second or third day A uniformly blood-stained fluid signifies cerebral contusion with leakage of blood into the subarachnoid space

X-ray examination of the skull—The skull should be examined radiologically on the second or third day after admission, when the immediate effects of the injury will have passed off If, however, there is any reason to suspect intracranial bleeding, [illegible]

in special cases

General treatment—The importance of adequate nourishment and fluid has already been stressed If the patient loses weight he is not being properly fed A careful watch must be kept on pressure points It is not necessary to keep the average case of cerebral contusion in a recumbent position for more than a week A patient may express a wish to have additional pillows or to sit up in bed or to read Such wishes should not only be granted but should be encouraged, the patient being allowed to assume the position in which he is most comfortable

Nourishment and fluid balance

A comatose or severely confused patient must receive an adequate amount of food and fluid The diet should be light and should contain at least 2,000 calories. In some cases of semi-coma the patient may be fed by a spoon if the swallowing reflex remains brisk.

Nasal feeding —In the absence of the swallowing reflex, nasal feeding will be necessary in comatose patients A Ryle's tube is best suited for this purpose The tube should be tested for patency by syringing water through it It should be lubricated with liquid paraffin or olive oil The patient is sat up and the tube is passed

When he is about to swallow another inch of the tube is passed, the tube will then be drawn into the oesophagus The tube is then pushed on rapidly or with successive swallows up to the third mark

of the two fingers, it is introduced into the oesophagus and then pushed on as previously described (Ransome, Paterson and Gupta, 1945)

In confused patients it may be necessary to produce light anaesthesia by means of

small amount of gastric contents

When the tube has been passed, the free end is brought alongside the nose and fixed to the forehead with strapping When not in use this end should be closed with a clip Some patients tend to pull the tube out, this can be prevented by adequate

injury. Information on this point will be gained by an estimation of the cerebrospinal fluid pressure If vomiting is persistent, fluid should be given by a continuous intravenous drip.

Care of the skin

Unconscious and paralysed patients readily develop bedsores. Change of position and a dry bed are the best means of preventing them. (*See under* Paraplegia, page 325)

for example, white blood cell count, fresh x-ray examination of the skull, examination of the cerebrospinal fluid, and encephalography and ventriculography should be carried out, but only when there are clear indications for them Prolonged headache following a head injury is usually psychogenic in origin Unless there are physical signs in the nervous system, such investigations should not be entered upon until a full inquiry into the patient's personality and previous psychological history has been made

Hysteria and anxiety states

Headache, dizziness, irritability, lack of concentration and of confidence, are symptoms which constitute the so-called post-concussion syndrome This is an ill-defined condition which includes cases of hysteria or anxiety neurosis as well as the milder
vised
with a
provide evidence of faulty upbringing and difficulties in adjustment in school, in employment and in the Services In such a case the doctor should explain to the patient at an early stage of convalescence that no damage to skull or brain has occurred, and should convince him that no harm will come to him if he gets up and occupies himself about the ward A certain number of patients, if treated in this way, will make a good recovery, others will require the help of a psychiatrist *Phenobarbitone ½–1 grain twice a day, is useful in this type of case*

Traumatic dementia

Under this heading are included various degrees of impaired intellectual capacity which may result from severe cerebral contusion, more particularly of the frontal lobes There may be no residual paralysis, but anosmia is common It may be noted that the patient, following a long period of mental confusion, is dull and takes little notice of his surroundings, he is content to be in bed or to sit about in the ward doing nothing On questioning him about current topics, it will be obvious that his memory is defective, and, in a severe case, he will be unaware of this In less severe cases the patient may declare that he is perfectly fit and wishes to return to work, but his behaviour in the ward will, as a rule, show clear evidence of deterioration The use of mental tests may be helpful in assessing more accurately the degree of deterioration and the progress of the case The psychiatrist's help should be asked for in this matter The possibility of breakdown, if the patient returns to work which is beyond his intellectual capacity, should be borne in mind If the mental changes seem out of proportion to the degree of injury, the Wassermann reaction should be tested

OCCUPATIONAL THERAPY AND PHYSIOTHERAPY

the rehabili-
uld be
under
ient is
uld be
assured that the slight intensification of head ccom-
pany physical effort is to be expected, and that with perseverance they will disappear

Use and abuse of hypertonic solutions.—In the average case of severe head
not substantially raised and, moreover, it may fall
there-
d a

The later stage

The attitude of the doctor and the nursing staff towards the patient's symptoms will determine to a large extent their early disappearance or their persistence In the majority of head injuries in persons under the age of 50 years, complete recovery is usual in a matter of a few weeks Nothing is more striking than the comparative
of symptoms (including headache) and the rapidity of convalescence in a
with a head injury is allowed
riety of ways.

AVERAGE PERIODS OF TREATMENT

Mild injuries

case in the category of mild head injuries are post-
of the skull
ip and
iche is
tal the

Moderate or severe injuries

than an hour or a blood-stained cerebrospinal

iger period in
ing prolonged
confusion

RESIDUAL SYMPTOMS

Headache

Headache was considered formerly to be an unavoidable sequel to a head injury, the more severe the headache the worse the injury and the slower the progress
realized that this attitude led to unnecessarily prolonged hospital-
intensity and,
end of the
third or fourth week. Headache may pe... *the patient* who shows other effects of a severe generalized contusion, for example, prolonged post-traumatic amnesia, mental retardation and impaired memory; (b) when
abscess, subdural haematoma,

adache, consideration should
nvestigations should be made,

TUMOUR

The outlook for a patient with a brain tumour has improved during the past 25 years, partly as a result of advances in surgical technique and partly owing to the

intracranial Of tumours which originate in the brain, approximately 50 per cent

to seed down the spinal cord Contrasting with these malignant forms of glioma is the cystic astrocytoma of the cerebellum with its mural nodule Complete removal of this tumour is possible The astrocytoma of the hemisphere has a less favourable prognosis The meningiomas, tumours of the pituitary body, auditory nerve

radiotherapy Metastatic tumours constitute about 15 per cent of all brain tumours It is clear that consideration of the pathology no less than recognition of the presence and site of a tumour is essential for the planning of treatment

IMPORTANCE OF ACCURATE DIAGNOSIS

An intracranial tumour may present (1) with signs of increased intracranial *pressure alone, (2) with focal signs of sudden or gradual onset, (3) as a case of* epilepsy, (4) as a case of dementia, or (5) with endocrine disorder. The presumptive diagnosis of a brain tumour rests on a detailed history obtained from the patient and his relations, and on the results of a competent neurological examination, to

d by clinical

, ventriculo-

graphy, angiography or electro-encephalography are often an essential prelude to treatment, but before submitting a patient to these procedures, every effort must be made to rule out the presence of a metastatic tumour, especially in a middle-aged patient A *history of loss of weight within the previous year should suggest a diag-*

brain tumour in an adult A negative result of an x-ray examination does *clude the possibility of a primary bronchial carcinoma, especially* in a patient who has a cough, recent loss of weight and a raised erythrocyte sedimentation rate The stomach, prostate gland, breast and thyroid gland are other sources from which carcinomatous cells in the brain may arise Lastly, there exists the small but important group of primary tumours of the nasopharynx or nasal sinuses which may

residual hemiplegia or monoplegia should be treated on lines similar to those described under Brain—Vascular Disorders (see page 270) Before discharge the patient should be taken for a walk outside the hospital so as to gain confidence.

Special Treatment

Aphasia

Disorders of speech following cerebral trauma are more amenable to re-educational methods than are those following cerebral vascular disease The re-education of an aphasic is a lengthy procedure and should only be attempted by those who have had special training As a preliminary, a detailed investigation into the nature and severity of the defect and into the patient's present and previous intellectual capacity should be made The following is a brief account of the methods used by the Brain Injuries Unit, Edinburgh, based on the works of Goldstein (1942) and Butfield and Zangwill (1946)

These methods of re-education, if carried out daily over several weeks, should result in considerable improvement in the majority of cases of post-traumatic aphasia

Disorders of expression (*motor aphasia*) —Direct methods of re-education should be employed At first there is preliminary training in the use of the appropriate lip and tongue muscles After this has been mastered the patient is taught by the therapist to imitate simple speech movements, with the aid of sight and touch If the patient can repeat the necessary speech sounds, their systematic repetition is used as a method of re-establishing voluntary control. As improvement occurs in speech, every effort should be made to develop it more and more in a natural setting, and exercises in reading, describing pictures and simple conversation are used for this purpose

Agraphia —Systematic exercises in copying, spelling and dictation are used for the treatment of agraphia

Receptive aphasia (*sensory aphasia*) —The approach must be indirect In dis orders of reading, the patient is taught to trace the outline of large block letters wit his finger-tips When the method has become automatic, he is given normal readir material and is asked to carry out writing movements in reaction to it In favourat cases the technique enables the patient to read accurately but slowly Metho must be adapted to each individual case In less severe cases of dyslexia (wo blindness) reading material of graded difficulty is provided and systematic exerc in reading, silently and aloud, are undertaken

Acalculia —For acalculia (difficulty in calculation) progressive exercises in a metic form the basis of re-education

Post-traumatic Epilepsy

Should an epileptic attack follow a cerebral trauma, prolonged admini of phenobarbitone, ½ grain thrice daily, will be necessary.

Butfield, E., and Zangwill, O L. (1946) *J Neurol Neurosurg Psychiat.*, 9, 75
Goldstein, K. (1942) *After-effects of Brain Injuries in War* London, Heinemar
Ransome, G A., Paterson, J C. S, and Gupta, L. M (1945) *Brit med. J*, 1,

EMERGENCY OPERATIONS

A patient with a brain tumour may be extremely ill with bouts of severe headache, recurrent vomiting or increasing drowsiness Hypertonic intravenous solution often revives a patient who is admitted to hospital unconscious (*see* Headache, page 291)

carried out before major operations for cerebellar tumours, especially in children

THE USE OF RADIOTHERAPY

The approximate degree of radio-sensitivity of primary brain tumours is as follows

the

Included in the radio-insensitive tumours are astrocytomas, a proportion of meningiomas, oligodendrogliomas chromophobe adenomas of the pituitary gland, and ependymomas (McWhirter, 1946)

If histological examination gives proof of a tumour which is radio sensitive then, following appropriate operative treatment, a course of radiotherapy should be given The dosage will require careful judgment since necrotic changes may follow overdosage

McWhirter, R (1946) *Proc R Soc Med*, 39, 673

VASCULAR DISORDERS

Disorders of the blood vessels of the brain fall into two categories, arterial and venous

DISORDERS OF THE CEREBRAL ARTERIES

T ... to the brain ... derived from the two internal carotid ... eans ... ries, the basilar artery and their branches

Arterial cerebral disease can produce symptoms in the following two ways

(1) By a temporary or permanent interruption of the blood supply to the brain A liberal supply of oxygen is essential for the welfare of the neurone In migraine and ... with hypertension symptoms of a temporary nature may ... the interruption of ... ning In cerebral arteriosclerosis the effects of anoxia on the ... more slowly

(2) By a local or generalized compression or destruction of brain tissue as seen in cerebral haemorrhage This may take one of several forms (a) extradural or subdural haemorrhage of traumatic origin (*see* Brain—Injuries, page 259), (b)

BIOPSY

Biopsy is performed when doubt exists as to the nature of a tumour Through a burr hole made over the site of the tumour, small pieces are removed by aspiration through a brain needle for histological examination If the services of a neuro

the clinical and special investigations

TREATMENT

It is beyond the scope of this article to discuss the surgical treatment of brain tumour except in general terms

RADICAL REMOVAL

INCOMPLETE REMOVAL

primarily by radiotherapy However, should vision be seriously affected when the case first comes under observation, operation should take precedence over radio-

with a tumour of the stalk (adamantinoma or craniopharyngioma) These tumours are not radio sensitive, and therefore operation is indicated when there is a progressive field defect or an obstructive hydrocephalus

Some of the benign gliomas may be partially removed in order to establish a free flow of cerebrospinal fluid, for the same reason a similar procedure may be needed in some of the highly malignant tumours such as a medulloblastoma extending into the aqueduct, before x ray therapy is instituted Each case must be regarded as an individual problem

DECOMPRESSION

Decompression may be needed as a palliative operation for the relief of high intracranial pressure or to preserve vision where removal of the tumour is impossible To be effective it must be a wide decompression in the region of the tumour In the case of radio-sensitive tumours x ray therapy is begun as soon as the wound is healed

CEREBRAL ANEURYSM

Cerebral aneurysm may give rise to symptoms at any age Only the congenital type of aneurysm will be considered This type develops as a result of a congenital deficiency in the arterial wall, usually at the junction of two arteries particularly the internal carotid and middle cerebral arteries, entering into the formation of the circle of Willis, and at the junction of the anterior cerebral and anterior communicating arteries Less commonly the aneurysm forms on the intracerebral course of one of the main arteries of the brain, particularly the middle cerebral and anterior cerebral arteries The aneurysm may either "leak" or rupture into the subarachnoid space or into the substance of the hemisphere, or it may cause pressure on certain cranial nerves, particularly the oculomotor nerve, the first division of the fifth nerve and, less frequently, the optic nerve The sudden onset of severe headache, or of coma, in an individual whose blood pressure is normal should suggest the diagnosis of a 'leaking" aneurysm On lumbar puncture the *cerebrospinal fluid will, as a rule, be uniformly blood stained*

General management

Absolute rest in bed is indicated If the patient is conscious, morphine ⅙–¼ grain may be necessary in order to alleviate headache and restlessness If the aneurysm has ruptured, a fatal termination is likely When an aneurysm 'leaks", coma or semi-coma may persist for one or more weeks Lumbar puncture may be repeated

pressure may be brought about by the rectal administration of 8 ounces of 25 per cent solution of magnesium sulphate The general management of the case is

making any sudden effort, and arduous work or play must be avoided as far as possible Residual hemiplegia will require physiotherapeutic treatment (*see* page 274)

Indications for operation

Recent clinical studies and the help given by angiography have widened considerably our knowledge of the symptomatology of cerebral aneurysm and have made possible accurate localization in an increasing percentage of cases Since the ultimate outlook for these patients is poor, surgery may be expected to play an in

cating artery

or otherwise unsuitable for a subsequent operation,

never the

a straight

has taken

on of the

cerebral haemorrhage due to 'leaking" or ruptured aneurysm (see page 272
(c) the classical form of cerebral haemorrhage associated with hypertension

CEREBRAL HAEMORRHAGE ASSOCIATED WITH HYPERTENSION

Deepening coma of abrupt onset in a hypertensive patient associated with blo
stained cerebrospinal fluid, is a clear indication of a progressive and fatal intrac
bral haemorrhage No line of treatment can combat the rapid rise in intracran
pressure and resultant medullary anaemia Death usually occurs within 48 hou
Treatment of the patient as outlined for cerebral thrombosis (see below) should
carried out

CEREBRAL THROMBOSIS AND CEREBRAL EMBOLISM

The treatment of cerebral thrombosis and cerebral embolism will be considered
under the same heading since their effect on brain tissue is essentially the same

Cerebral thrombosis may occur in association with hypertension, but it is equally
common in the elderly patient with a decrescent type of arteriosclerosis Between
the ages of 25 and 50 years a cerebral thrombosis, unassociated with hypertension,
may be due to syphilis The explanation of a cerebral embolus is usually to be
found on examination of the heart, for example mitral stenosis, auricular fibrilla
tion, infective endocarditis or recent cardiac infarction

Prevention of spread of thrombosis

In the case of a hypertensive patient who is comatose from apoplexy, a non
progression of the coma with a normal or yellowish cerebrospinal fluid will favour
thrombosis rather than haemorrhage Depletive measures are generally contra
indicated in thrombosis and accordingly venesection is not advisable Anticoagu
lants are still under trial in the treatment of thrombosis of the cerebral arteries In
cerebral embolism the use of nicotinic acid 100–200 milligrams given intravenously,
has been recommended with the purpose of producing arterial dilatation.

The underlying cause

Treatment of the underlying cause particularly applies to syphilitic thrombosis
and to cerebral embolism (see Syphilis of the Nervous System, page 344 and
Ischaemic Heart Disease page 182)

General management

If the patient is in a coma the head should be supported by two or more pillows
and should be turned to one side The patient should be nursed on a Dunlopillo
mattress or on a water bed The feet should be supported by sand bags The
presence or absence of the swallowing reflex should be determined by dropping a
small amount of water on to the back of the tongue If this reflex is diminished or
absent, feeding should be carried out by a nasal catheter introduced into the
stomach If retention of urine occurs catheterization will be necessary The other
principles in the nursing of a comatose patient described in the section on Brain—
Injuries (see page 261), apply equally to cases of cerebral thrombosis The risk of
broncho-pneumonia in elderly patients is considerable After the first 48 hours the
patient should be propped up in a semi reclining position by means of additional
pillows.

1½–2 grains daily, is indicated, in addition to the treatment previously prescribed under hypertensive cerebral attacks

CEREBRAL VENOUS THROMBOSIS

Thrombosis of the intracranial venous sinuses in an adult is usually the result of an infection or trauma The infective focus may be local, for example, otitis media an empyema of a nasal sinus, a wound in the head or a septic focus in the region of the face On the other hand, the source of infection may be elsewhere, for example, in the pelvis or in the veins of the lower limbs During the puerperium, infected clots may travel back by the pelvic veins to the veins in the vertebral canal and thus infection may be carried upwards to the dural sinuses and the cerebral veins (Batson, 1940) When a patient is suspected of having a pelvic thrombosis every precaution should be taken to avoid straining, a binder should not be too tight and the patient should be kept well propped up in bed (Martin, 1941) The clinical pictures produced by thrombosis of the lateral and cavernous sinuses are well known Thrombosis of the superior longitudinal sinus may lead to thrombosis of [illegible]

[illegible] pressure may rapidly develop owing to interference with the absorption of the cerebrospinal fluid

TREATMENT

[illegible] all as the infection itself When the [illegible] hould be [illegible] alt with

Chemotherapy should be employed as in the treatment of pneumococcal menin gitis (*see* page 303) An external hydrocephalus resulting from a thrombosis of the superior longitudinal sinus or from factors leading to an excessive production of cerebrospinal fluid, should be treated by attention to any underlying source of in fection and by daily lumbar puncture The fluid should be withdrawn slowly until the pressure is reduced to 160–180 millimetres of water This routine should be followed until papilloedema begins to subside Punctures should then be performed every other day and subsequently at longer intervals

TREATMENT DURING RECOVERY FROM A CEREBRAL VASCULAR ACCIDENT

DURATION OF STAY IN BED

Except in a case of a "leaking" aneurysm or when cardiac or pulmonary com plications are present, a patient should be kept in bed for the minimum of time At the end of 2–3 weeks a hemiplegic patient should be lifted out of bed into a chair and should remain there for longer periods each day

TREATMENT OF HEMIPLEGIA

In order to obtain the maximal degree of recovery in a paralysed limb it is necessary to institute, at an early stage treatment which will prevent adhesions in joints and shortening of hypertonic muscles In severe hemiplegia the paralysed

common carotid artery in the neck In an otherwise healthy subject, if certai[n pre-]
cautions are taken, the risk of a hemiplegia exists but is slight, whereas the pro[spect]
of a permanent cure is considerable This procedure of ligation is contra indic[ated]
in the elderly Aneurysms of the anterior cerebral artery or of th[e] ...
cating artery require a transfrontal appro[ach] ...
Unless the services of an e[...]
treatment is inadvisable

During the acute stage of a ... [pe]rsistent coma, with or without signs of
hemiplegia, is suggestive of an intracerebral haemorrhage from an ...
on the anterior or middle cerebral artery The ...
ventricle rather than into th[e] ...
grap[h] ...
ane[...]
the ...
cure ... d

HYP[ERTENSIVE] ... [CER]EBRAL ENCEPHALOPATHY (HYPERTENSIVE CEREBRAL ATTACKS)

In patients suffering from hypertension whether essential or secondary to renal ... permanent disease, an abrupt rise in blood pressure above the previous level may give rise to alarming cerebral symptoms which were in the past attributed to uraemia As a rule, in patients under the age of 50 years there is an abrupt onset of severe headache with vomiting Papilloedema rapidly develops and the pressure of the cerebrospinal fluid is raised Coma may ensue convulsions are uncommon Other signs of so-called "malignant hypertension" usually, but not invariably, make their appearance in the course of a few days or weeks In the older type of patient, headache is followed by convulsions, coma and focal signs such as hemianopia, aphasia or hemiplegia Signs of increased intracranial pressure are absent After a few hours or days, the blood pressure falls and symptoms clear up entirely or focal signs remain

Treatment

The aim of treatment should be a reduction in blood pressure. It is doubtful whether the usual methods employed—namely a liberal venesection, and in cases showing papilloedema, the use of hypertonic solution (8 ounces of 25 per cent solution of magnesium sulphate, per rectum) and lumbar puncture—do more than give relief temporarily Generalized vasoconstriction, if not the actual cause of the rise in blood pressure, undoubtedly is an important factor in its prolongation, but one of the vasodilator drugs is of real benefit A mercurial diuretic, by producing uresis, may sometimes prove of value. The presence of a mild degree of albumin-ua is not a contra indication to its use. Alternatively, sedatives may be given (see adache, page 287)

odium luminal, 3 grains, given intramuscularly, may be necessary to control eptiform attacks In the younger age-group, primary renal disease is the usual e of hypertension Suitable investigations should be carried out in order to lish the presence or absence of gross unilateral renal disease, since nephrectomy a better prospect for these patients than that offered by bilateral sym-tomy (Smithwick's operation) In the older type of patient, phenobarbitone,

during this period *Unless the disease has* reached an advanced stage, a pregnancy should not be terminated but active treatment should be begun without delay

The importance of the psychological factor in relation to disseminated sclerosis has been underestimated *in the past* *A close relationship may exist between mental* stress or anxiety and a relapse The circumstances of the patient's life should be inquired into and frankly discussed with the object of removing any obvious source of tension Heretofore, every effort was made to keep a patient suffering from disseminated sclerosis in ignorance of the diagnosis Not infrequently this was unsuccessful, with the result that patients gained from books or from other patients an unnecessarily pessimistic outlook on their complaint The diagnosis of "chronic infection of the nervous system" will satisfy the majority of patients, whilst others may ask for the precise name of the disease or for a confirmation of a previous diagnosis of disseminated sclerosis Under these circumstances, the name of the disease should not be withheld, at the same time, an explanation of its general nature should be given, care being taken to avoid the impression of a condition which will inevitably lead to paralysis The necessity for prolonged treatment and *attention to general health should be emphasized*

PROLONGED ADMINISTRATION OF ARSENIC, AND ARTIFICIAL PYREXIA

Inorganic and organic preparations of arsenic are worth a trial, particularly in early cases The following regimen has recently been recommended (Cloake, 1947)

Intravenous N.A B	Number of courses per annum	Details of course
For first 3 years	4	*Each course consists of 4 injections*
4–5 years	3	0 3 g , 0 45 g , 0 45 g , and 0 45 g
6–10 years	2	

If the intravenous route is impossible, then 6 intramuscular injections of [illegible] should be given in one course

[illegible] ums, should be given [illegible] be used in cases unsuitable for injections of N A B

Artificial pyrexia has been advocated from time to time in the treatment of disseminated sclerosis It may be used as a precursor to arsenical treatment (Cloake, 1947) Fever is produced by intravenous T.A B vaccine for protein *shock* *The* [illegible] supplied in three strengths in rubber-capped bottles, of 10 million, [illegible] itre, no dilution of the vaccine is [illegible] owed by 30–40 million, 75 million [illegible] or in the presence [illegible] d subsequent [illegible] duced by the [illegible] 3–4 days, in [illegible] nal tempera- [illegible] sed as a substitute for T A.B vaccine, the constitutional upset is less severe

foot, unless there has been a considerable return of power.

Of equal importance are passive movements of all joints through a full range, with stretching of hypertonic muscles This treatment should be carried out by a

active movements of the unaffected limbs and of the trunk and abdominal muscles

joints, then at the elbow and knee and last of all in the hand and foot. He should attempt movements at all joints in order to obtain a clear idea of how each movement is normally executed

reduced to a minimum and movements of the joints are facilitated The Guthrie-Smith suspension sling frame
frame or the more portable
consisting of a single uprig'
particularly for patients being cared for in their own homes The apparatus can be attached to the head of the bed and provides a means by which the patient may learn to move himself in bed by means of the unaffected arm If these special forms

DIVERSIONAL THERAPY

PHYSIOTHERAPY IN ESTABLISHED PARAPLEGIA

In the *stage of established* paraplegia much can be done by skilled physiotherapy As far as possible active rather than passive movements are preferred, re-educative exercises will lessen incoordination and ataxia Not uncommonly, *through lack of* confidence, a patient's range of activity is lessened to a greater degree than is warranted by the organic changes, the detection and treatment of this '*functional*' component by doctor and physiotherapist are matters of the greatest importance Details of treatment at this stage are described under Paraplegia (*see* page 325)

[illegible] paresis or postural loss in the upper limbs is not severe, occupations covering a wide range are now available for the paraplegic patient These include weaving, rug making, toy making, leather work and so on If a patient shows an aptitude for any particular type of work when in hospital, arrangements should be made through the almoner's department for a supply of tools and materials which will enable the patient to occupy himself at home, and possibly add to his income

OTHER FORMS OF TREATMENT

A course of 12 weekly injections of iodobismuthate of quinine (Quinostab) may be given in place of arsenical injections should the patient prove hypersensitive to the latter

A warning must be given against the indiscriminate use of a vaccine prepared from the urine, faeces and nasopharynx of patients suffering from the disease A diphtheroid organism figures largely in its composition Re activation of lesions in the nervous system amounting to an acute myelitis may follow its use

Cloake, P C (1947) Humphry Davy Rolleston Lecture 'The Treatment of Disseminated Sclerosis by Artificial Pyrexia and Prolonged Administration of Arsenic Royal College of Physicians

ENCEPHALITIS—ACUTE

CLASSIFICATION

Encephalitis is an inflammatory condition of the brain due to bacterial or virus infection The following are the more common types

(1) Pyogenic, for example, acute meningococcal or pneumococcal meningo-encephalitis, and suppurative encephalitis (*see* Brain—Abscess, page 258)

(2) Syphilitic, for example acute syphilitic meningo-encephalitis

(3) Virus encephalitides (a) polio-encephalitis, (b) epidemic encephalitis (encephalitis lethargica), and (c) a variety of forms, some due to insect borne viruses

The virus of poliomyelitis is at present the commonest cause of brain stem encephalitis in the United Kingdom, but it is an unusual cause of hemisphere encephalitis

(4) Encephalitis complicating certain infectious fevers (a) those caused by a virus,

Reaction following treatment with intravenous N A B and pyrexia—Not uncommonly an exacerbation of pre-existing symptoms occurs during artificially
of non-specific
subsidence of
do not form a
contra-indication to further treatment More rarely such symptoms persist, thus constituting a true relapse. In such cases treatment should be discontinued, but may be resumed 1–2 months later with smaller doses of N A B Mild toxic effects of N A B sometimes appear, such as fever and constitutional symptoms, as a rule, treatment should not be interrupted. If vomiting, dermatitis or jaundice supervene, treatment with N A B should be abandoned and BAL should be given Subse-

that these may not be so severe or so frequent as in untreated cases

Physiotherapy—The period of rest in bed will vary from 3–4 weeks On completion of treatment, graduated exercises in bed for the limbs and trunk should be followed by other exercises The necessity of continuing these exercises regularly

and that reactivation of old ones may be kept in check. Artificial pyrexia at this stage of the disease is unlikely to be beneficial Any measures which will enable the patient to continue work should be adopted, provided travelling does not result in undue fatigue In an advanced case, the patient should not be kept in bed, but should spend most of the day in a comfortable chair Whenever possible the patient's bedroom should be on the ground floor, a wheel-chair or an electrically propelled chair will widen considerably the range of interest

Frequency of micturition may be a troublesome symptom If the urine is acid the following mixture, 1 tablespoonful, 3 times a day, may be given.

Potassium citrate	30 gr	2 g
Tincture of belladonna .	10 min	0 6 ml
Water to .	½ fl oz.	15 ml

Incontinence occurs in the later stage of the disease The measures that may be taken to deal with this symptom are discussed under Paraplegia (*see* page 325)

Spasticity may be a marked feature in the more advanced stage of the disease, and troublesome flexor spasms may interfere with sleep In such cases Myanesin is worth a trial It is given in ½-ounce doses 3–5 times daily. In favourable cases tone is diminished and sometimes power is temporarily improved Other measures include passive movements carried out 2–3 times daily, a hot bath at night and phenobarbitone, 1 grain, at bedtime.

PHYSIOTHERAPY IN ESTABLISHED PARAPLEGIA

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Occupational therapy

[illegible]

plegic patient These include weaving, rug making, toy making, leather work and [illegible]

possibly add to his income

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A warning must be given against the indiscriminate use of a vaccine prepared from the urine, faeces and nasopharynx of patients suffering from the disease A diphtheroid organism figures largely in its composition Re-activation of lesions in the nervous system amounting to an acute myelitis may follow its use

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The virus of poliomyelitis is at present the commonest cause of brain stem encephalitis in the *United Kingdom, but it is an unusual* cause of hemisphere encephalitis

(4) Encephalitis complicating certain infectious fevers. (a) those caused by a virus,

for example mumps and herpes zoster; and (b) those characterized by demyelination (disseminated encephalo-myelitis), for example, following measles or chicken pox

(5) Toxic encephalopathies, for example, arsenic, lead, malaria, heat stroke

TREATMENT

Lumbar puncture should be carried out in every case of encephalitis in order to exclude pyogenic and syphilitic forms of meningo-encephalitis Lumbar puncture may be repeated as a therapeutic measure if the fluid is under pressure and if head ache is relieved

Specific

As yet there is no specific treatment for the virus forms of encephalitis Many have been advocated, but none is of value in influencing the course of the disease A transfusion of 50 millilitres of whole blood or of plasma from a healthy individual may be of value in cutting short the febrile stage in some cases

General Principles

The measures adopted in any infectious fever apply equally to a case of encepha

personnel should wear masks and should be protected as for nursing of a case of acute poliomyelitis (*see* page 333)

Careful nursing is essential Retention of urine will require catheterization Incontinence of urine is more usual and may readily lead to bedsores in comatose patients unless frequent changes of position are made and wet sheets avoided Restlessness, insomnia or involuntary movements may be partially controlled by sedatives such as phenobarbitone 1 grain thrice daily, or paraldehyde in doses varying from 120–240 minims every six hours

Fluids and Nourishment

If coma or semi-coma or a severe confusional state persists for more than 2 days, fluids and adequate nourishment must be given by nasal tube passed into the *stomach and retained in position by adhesive plaster (see Brain—Injuries, page 263)*

Convalescence

This must be protracted The patient should not be kept in bed for an unduly long period Exercises under the direction of a physiotherapist should form an important part of convalescence, the same remark applies to diversional therapy

EPILEPSY

INTRODUCTION

Epilepsy is characterized by a brief and sudden disturbance of cerebral function attended usually by loss of consciousness and sometimes by convulsions

In the idiopathic form of epilepsy, the two factors which appear to be responsible for the condition are first, an inherited instability of cortical neurones and secondly, some factor which determines the appearance of fits, such as trauma or

PHYSIOTHERAPY IN ESTABLISHED PARAPLEGIA

In the stage of established paraplegia [illegible]

confidence, a patient's range of activity is lessened to a greater degree than is warranted by the organic changes, the detection and treatment of this 'functional' component by doctor and physiotherapist are matters of the greatest importance Details of treatment at this stage are described under Paraplegia (*see* page 325)

Occupational therapy

This may be a great help in providing an outlet for interest and in maintaining morale Provided that intention tremor, paresis or postural loss in the upper limbs is not severe, occupations covering a wide range are now available for the paraplegic patient These include weaving, rug making, toy making, leather work and [illegible]

possibly add to his income

OTHER FORMS OF TREATMENT

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(5) Toxic encephalopathies for example arsenic lead malaria heat stroke

TREATMENT

[illegible] encephalitis in order to [illegible] ache is relieved

SPECIFIC

As yet there is no specific treatment for the virus forms of encephalitis Many have been advocated but none is of value in influencing the course of the disease A transfusion of 50 millilitres of whole blood or of plasma from a healthy individual may be of value in cutting short the febrile stage in some cases

GENERAL PRINCIPLES

[illegible] acute poliomyelitis (*see* page 333)

Careful nursing is essential Retention of urine will require catheterization Incontinence of urine is more usual and may readily lead to bedsores in comatose patients unless frequent changes of position are made and wet sheets avoided Restlessness insomnia or involuntary movements may be partially controlled by sedatives such as phenobarbitone 1 grain thrice daily or paraldehyde in doses varying from 120–240 minims every six hours

FLUIDS AND NOURISHMENT

If coma or semi-coma or a severe confusional state persists for more than 2 days, fluids and adequate nourishment must be given by nasal tube passed into the stomach and retained in position by adhesive plaster (*see* Brain—Injuries page 263)

CONVALESCENCE

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EPILEPSY

INTRODUCTION

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PHYSIOTHERAPY IN ESTABLISHED PARAPLEGIA

In the stage of established paraplegia much can be done by skilled physiotherapy As far as possible active rather than passive movements are preferred, re-educative exercises will lessen incoordination and ataxia Not uncommonly, through lack of confidence, a patient's range of activity is lessened to a greater degree than is warranted by the organic changes, the detection and treatment of this "functional component by doctor and physiotherapist are matters of the greatest importance Details of treatment at this stage are described under Paraplegia (*see* page 325)

Occupational therapy

This may be a great help in providing an outlet for interest and in maintaining [illegible]

arrangements should be made through the almoner's department for a supply of tools and materials which will enable the patient to occupy himself at home, and possibly add to his income

OTHER FORMS OF TREATMENT

A course of 12 weekly injections of iodobismuthate of quinine (Quinostab) may be given in place of arsenical injections should the patient prove hypersensitive to the latter

A warning must be given against the indiscriminate use of a vaccine prepared from the urine, faeces and nasopharynx of patients suffering from the disease A diphtheroid organism figures largely in its composition Re-activation of lesions in the nervous system amounting to an acute myelitis may follow its use

Cloake, P C (1947) Humphry Davy Rolleston Lecture "The Treatment of Disseminated Sclerosis by Artificial Pyrexia and Prolonged Administration of Arsenic" Royal College of Physicians

ENCEPHALITIS—ACUTE

CLASSIFICATION

Encephalitis is an inflammatory condition of the brain due to bacterial or virus infection The following are the more common types

(1) Pyogenic, for example, acute meningococcal or pneumococcal meningo-encephalitis, and suppurative encephalitis (*see* Brain—Abscess, page 258)

(2) Syphilitic, for example acute syphilitic meningo-encephalitis

(3) Virus encephalitides (a) polio-encephalitis, (b) epidemic encephalitis (encephalitis lethargica), and (c) a variety of forms, some due to insect-borne viruses

The virus of poliomyelitis is at present the commonest cause of brain stem encephalitis in the United Kingdom, but it is an unusual cause of hemisphere encephalitis

(4) Encephalitis complicating certain infectious fevers (a) those caused by a virus,

for example mumps and herpes zoster; and (b) those characterized by demyelination (disseminated encephalo myelitis) for example, following measles or chicken-pox

(5) Toxic encephalopathies for example, arsenic, lead, malaria, heat stroke

TREATMENT

Lumbar puncture should be carried out in every case of encephalitis in order to exclude pyogenic and syphilitic forms of meningo-encephalitis Lumbar puncture may be repeated as a therapeutic measure if the fluid is under pressure and if head ache is relieved

Specific

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General Principles

[illegible]

personnel should wear masks and should be protected as for nursing of a case of acute poliomyelitis (*see* page 333)

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[illegible] range are now available for the para plegic patient These include weaving rug making toy making leather work and [illegible]

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General Principles

The measures adopted in any infectious fever apply equally to a case of encephalitis When a cause for the condition cannot be found it may be assumed that a virus is responsible In such a case isolation is not essential but if the patient is nursed in a general ward the barrier system should be adopted Nursing and med cal personnel should wear masks and should be protected as for nursing of a case of acute poliomyelitis (*see* page 333)

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infection In symptomatic epilepsy the inherited factor is less important than the acquired one the latter may be cerebral or extra-cerebral Electroencephalography has added much to our knowledge of the disturbance in the brain during an attack Normally electric potentials may be recorded from the brain, they follow a certain pattern and occur at a frequency of 7–10 per second In epilepsy the majority of patients show some abnormality in the electroencephalogram between seizures In major epilepsy an attack is heralded by the appearance of large spikes at a fast

THE PRESENT-DAY OUTLOOK

and Fox (1947) in Great Britain, have done much to improve the status of such *patients It has been shown that of epileptics outside institutions nearly 75 per cent* are fit for most forms of employment. However, much prejudice on the part of employers must be overcome. The medical practitioner, by taking a more optimistic and realistic attitude towards his epileptic patients, can encourage them to seek work and in other ways can do much to maintain their morale

The attitude of the family towards a patient with epilepsy is well expressed in the following passage (Fox, 1947)

> "The knowledge that epilepsy tends to run in families adds to the impulse for concealment that often has so strong a hold on epileptics and their relatives The desire at

the American Epilepsy League, set
of which there is an
public in regard to
epilepsy and the promotion of research

calculated to increase rather than diminish the confidence of the patient

GENERAL MANAGEMENT

In considering the treatment of a case of epilepsy, it is important to determine, as far as possible, whether the case comes under the heading of "idiopathic" or "symptomatic" The age of the patient at the onset of the attacks, along with a consideration of the personal and family history, will usually decide this point An electroencephalogram may be of value when there is doubt as to the nature of the

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daily. Phenobarbitone should be given at the same time in doses of 1½ grains daily Phenytoin sodium does not combine well with Tridione and should be avoided Since Tridione has no effect on major epilepsy, in a patient who suffers from both types of attack somewhat larger doses of phenobarbitone will be necessary After some months, withdrawal of Tridione may be possible, phenobarbitone should be continued. Minor epilepsy which does not respond to Tridione is usually of the psychomotor variety, it is best treated with phenytoin sodium Caffeine has also proved of some value in the treatment of minor epilepsy, with a daily dose of 10–15 grains.

Status Epilepticus

This serious condition arises, as a rule, because of cessation of treatment It [illegible] regarded as an [illegible]

sodium phenobarbitone, 1–2 grains, or pentobarbitone sodium (Nembutal) 1½–3 grains, *these doses may be repeated after 3 or 4 hours In less severe cases 2 or 3 grains of soluble phenobarbitone intramuscularly may suffice. If none of the* above drugs is available, paraldehyde in doses of 5–10 millilitres injected deeply into muscle is usually effective, this dose may be repeated 4 hours later.

Toxic Effects of Barbiturates

[illegible] patient who is hypersensitive to [illegible]

of dysarthria, nystagmus, tremor or ataxia and an unsteady gait. With prompt reduction in the dose or, in severe cases, complete withdrawal of the drug for [illegible] Phenytoin sodium may cause hypertrophy of [illegible] ual glare [illegible] omplica-tion, agranulocytosis has been reported following the use of this drug, a monthly white blood cell count should therefore be carried out as a routine

Symptomatic Epilepsy

Whenever possible the underlying cause should be treated Attacks of epilepsy should be controlled in the way already described.

Traumatic Epilepsy

[illegible] presents a special problem As a general rule the results of [illegible] ound of the [illegible] on is more likely to be effective in such cases than in epilepsy following a severe closed injury The drug control of the attacks follows lines already described

INSTITUTIONAL TREATMENT

Frequently recurring major attacks of epilepsy will prevent education or employment. It is advisable that such patients should be admitted to an *epileptic colony*

attacks. In a case of suspected symptomatic epilepsy a thorough physical examination should be followed by an x-ray examination of the skull, a Wassermann test of the blood, an examination of the cerebrospinal fluid, an electroencephalogram, and any other investigations indicated by the history An encephalogram or angiograph may be necessary, but these specialized types of investigation *should not be embarked upon unless there is other evidence of a space-occupying* lesion or a vascular abnormality, since the importance of cerebral tumour as a cause of epilepsy arising after the age of 30 years has, in the past, been over-emphasized (Nattrass, 1949)

The co-operation of the patient and his relatives will be more readily obtained if they are impressed with the following facts (1) the proper use of drugs will result in the effective control of attacks in the majority of cases, (2) treatment must be continuous and prolonged (3) under no circumstances should medicine be omitted without permission of the doctor, and (4) the modern drugs now in use for the control of epilepsy do not result in intellectual deterioration

SOCIOLOGICAL FACTORS

The Individual

The attitude of the child, adolescent or adult towards his complaint is largely determined by that of his relations friends, schoolteachers and doctor Worry, over anxiety or pity reflected in the attitude of those with whom the patients come in contact will soon create loss of confidence and a sense of inferiority On the other hand if a common sense view of the case is taken by the doctor, and is communicated to parents and schoolteachers, the individual may come to regard the attacks as a minor inconvenience no worse than the bilious attack from which some of his friends suffer As long as he is allowed to live a normal life with few restrictions, the patient with epilepsy will retain an outlook on life which is normal or nearly so, and will have *the opportunity of developing the degree of confidence* necessary to equip him for work after leaving school

School

The same sort of approach should be made by the general practitioner to the

major attacks are so frequent as to interfere seriously with the conduct of classes or with the boy's progress the headmaster will be justified in asking for the boy's withdrawal from the school. Before this step is taken every effort must be made by all those concerned to modify routine and treatment so that he may be given the maximum chance

Special schools

If an epileptic child is subnormal mentally, or if the frequency of attacks precludes his attendance at an ordinary school, it may be necessary to send him to a

AETIOLOGY

In the treatment of headache it is essential to identify the aetiological factor or factors responsible for it The following paragraphs refer to the more common causes of headache

THE HEADACHE OF BRAIN TUMOUR

Displacement or traction of blood vessels is the principal cause of the headache of brain tumour *It is not necessarily accompanied by signs of increased intra cranial pressure* It is at first intermittent, but at a later stage it is continuous with periodic exacerbations It is made worse by any activity which tends to raise intra cranial pressure, such as stooping, coughing or straining at stool When in bed patients generally prefer sitting up supported by pillows to lying flat In a case of supratentorial tumour with frontal headache, the subsequent appearance of occipital pain should suggest a marked degree of internal hydrocephalus, and should call for operation at an early date Vomiting accompanying the headache of *cerebral tumour is another indication of increasing hydrocephalus*

VASCULAR HEADACHES

The characteristic throbbing quality of vascular headaches is well exemplified by migraine In this condition spasm of branches of the external carotid artery is followed by their dilatation and by the appearance of headache (*see* Migraine, page 308)

The mechanism of headache in patients suffering from hypertension is similar to [illegible] ng factors

[illegible] s

may indicate the early stage of a *malignant hypertension* A severe headache of dramatically sudden onset is typical of a leaking cerebral aneurysm Headaches [illegible]

influenza, but any bacterial toxaemia may be the cause of headache [illegible] of [illegible] te and chronic Anaemia and polycythaemia rubra vera are [illegible] hes of vascular origin also include [illegible] ntracerebral *venous engorgement*) severe or persistent coughing and uraemia Idiosyncrasy may be an important factor in the causation of headaches due to a variety of poisons and drugs such as lead, belladonna, alcohol and tobacco Headaches due to crowded, ill ventilated rooms are partly toxic and in part due to fatigue, the latter is a common precipitat *ing factor in all types* of vascular headache

REFLEX HEADACHES DUE TO NEIGHBOURHOOD DISORDERS

Certain disorders of the nose and eye may be accompanied by headache Pain due to disease of the nasal sinuses is, as a rule, poorly localized, it is due to stimula [illegible] and [illegible] of the fifth cranial nerve by inflammation or engorgement of [illegible]

forehead As a rule it begins soon after rising in the morning increases [illegible]

where they will benefit from regular work, discipline and community interests. If epilepsy is associated with mental deficiency or insanity, treatment in a mental institution will be necessary

DOUGLAS McALPINE

Fox J T (1947) *Lancet* 1, 775
Lennox, W G (1941) *Science and Seizures, a New Light on Epilepsy and Migraine* New York, Harper Brothers
— (1945) ' Petit Mal Epilepsies, their Treatment with Tridione " *J Amer med Ass*, 129 1069
— Gibbs, F A., and Gibbs, E L. (1940) "The Inheritance of Cerebral Dysrhythmia and of Epilepsy ' *Arch Neurol Psychiat*, 44, 155
Nattrass, F J (1949) *Brit med J*, 1, 1, 43

HEADACHE

Headache is one of the commonest symptoms for which patients seek advice In the great majority of cases it is not associated with gross structural change in the brain or its coverings, but is due to a disturbance or disease of the cerebral circulation, to a state of physical or emotional fatigue or to psychogenic factors It is of ... sease of the brain or any cause of referred

PHYSIOPATHOLOGY OF HEADACHE

... ally nerves and arteries
sinuses and to the larger
ifth cranial nerve, those
cranial nerves and upper
ire insensitive to pain
uch the following are the
most important ... teries, venous sinuses or veins within the skull Traction on these structures rather than increased intracranial pressure is the usual mechanism by which a headache is produced by a ... lesion by meningitis and by severe cerebral trauma (2) By
...ly by raised intravenous
rtension, with fevers and
to dilatation of arteries
and stimulation of nerve endings ... headache that may occur in congestive heart failure is probably due to increased intracerebral venous pres- ... involving the pain sensitive structures
deformans, syphilitic periostitis
flex headache due to neighbour-
hood disorders Under ... led headaches due to iritis and
... to blocking of the ostia (Wolff,
mple headache of gastric

fatigue The patient will often complain of difficulty in concentration or of mild depression Unlike the majority of other headaches the psychogenic headache may be constant with exacerbations which are related to emotional factors Tenderness over the scalp and posterior neck muscles is relatively common An added source of anxiety may be the belief that a tumour of the brain is responsible for the head ache

TREATMENT

be ready to supplement his clinical examination without delay by examination of the cerebrospinal fluid, x ray examination of the skull and sinuses and examination of the blood

General

Rest in bed or on a couch in a dark room is advised in any case of severe or persistent headache

Medicinal

Aspirin, 10–15 grains, taken with a glass of water is a simple remedy Five grain tablets are crushed before they are swallowed The following preparation may be more effective than aspirin alone

Aspirin	*10 gr*	0 6 g
Phenacetin	6 gr	0 4 g
Mucilage	Sufficient	Sufficient
Chloroform water to	½ fl oz.	15 millilitres

For a migraine type of headache *caffeine citrate in full doses* will often give relief provided that the patient lies quietly for three quarters of an hour after taking it The dose of caffeine citrate is 5–7½ grains Some people can tolerate 10 grains It is best given with an equal quantity of aspirin (*see* Migraine, page 308) In severe

relief of the intolerable headache sometimes accompanying intracranial [illegible] and the later stages of malignant hypertension

towards midday and lessens in the evening The pain has a deep aching quality and is not usually severe except in the acute stage. The pain caused by an acute infection of the antrum may be felt locally, but it may also be referred to the temporal region ... by the pain of an anterior ethmoiditis A ... well as a deep-seated local ... disturbance of the mucous ... tion is often mistaken for a ... modification of the patient's ... ise, together with treatment with drugs such as ephedrine, ergot ... caffeine, or an antihistamine drug, would obviate the necessity of operation in many cases of so-called "sinus" headache

Of ocular conditions, acute or subacute glaucoma may cause headache which is at first localized in the eyeball as a sharp pain, later extending round the eye and over the forehead as a dull ache, vomiting may sometimes occur when the intra- ... Iritis causes both a local and frontal pain which is ... and

... of the cervical spine and prolapse of a cervical intervertebral ...

REFLEX HEADACHE DUE TO REMOTE DISORDERS

Another group of headaches of extracranial causation depends on the part ... nerve as the somatic sensory nerve corresponding to the ... innervated by ... within the ... bly third ... headaches of gastric, biliary and ... s may be associated with men- ... disturbance of the intracranial ... he rectum or pelvic colon, is an ... the bowel is emptied indicates

POST-TRAUMATIC HEADACHE

... headache following cerebral trauma is often a

... referred ... ly ... al

during the day-time A considerable fall will be accompanied by relief of headache and at the same time will indicate an element of arterial spasm The lower bowel should be kept empty, a light diet is advised The output of urine should be measured, if low, a mercurial diuretic (mersalyl, 2 millilitres) may be given as an alternative to sedation If it produces a considerable diuresis it should be repeated If good results are obtained by treatment on the above lines a further period of 1–3 weeks' rest in bed is advised because by this means the blood pressure may be stabilized at a lower level Potassium thiocyanate may be an effective remedy (*see* Arterial Hypertension) Meanwhile the general treatment advised for arterial hypertension is prescribed

PSYCHOGENIC HEADACHES

Treatment should be directed towards the underlying cause

DOUGLAS McALPINE
GEOFFREY EVANS

Head, H (1894) *Brain*, 17, 339
Puech, P, Guilby, P, Morice, J, Brun, M (1948) *Proc R Soc Med*, 41, 72
Wolff, H G (1948) *Headache and other Head Pain* New York, Oxford University Press

HERPES ZOSTER

Herpes zoster is an acute infection of virus origin affecting chiefly the posterior root ganglia of the spinal cord and sensory ganglia of the cranial nerves, associated with a painful vesicular eruption of the skin The posterior part of the spinal cord, especially the region of the posterior horn may be affected, and, more rarely, the anterior horn cells, resulting in muscular wasting of segmental distribution There is a close relationship between the virus of varicella and that of herpes zoster The incubation period varies from 2 to 3 weeks

OPHTHALMIC HERPES ZOSTER

Ophthalmic zoster results from an infection of the Gasserian ganglion There is a characteristic group of vesicles on the forehead A serious complication is corneal ulceration

GENICULATE HERPES ZOSTER

In this condition pain in the ear is followed by an eruption of vesicles in that locality, more rarely on the anterior pillar of the fauces Facial palsy is a common complication

POST-HERPETIC NEURALGIA

This is a distressing and not uncommon sequel to herpes zoster in elderly persons

TREATMENT OF ACUTE STAGE

The patient should have complete rest in bed for 3–4 weeks The vesicles and surrounding skin should be gently cleansed with spirit Unna's paste is then applied with a brush, and a layer of gauze is immediately applied to the paste Two more layers of Unna's paste separated by a single sheet of gauze are applied This dressing is soaked off with warm water after 3 or 4 days and reapplied This process

Physiotherapeutic

The simplest aids for the relief of headache are a cold compress to the forehead or the application of heat to the nape of the neck. When the headache is due to

trauma which may have been months or even years earlier, the best treatment may be mobilization of the neck with traction. Before the neck is mobilized an x ray examination must be made, and the treatment should be carried out by an experienced, qualified physiotherapist. If there is clear evidence of a prolapsed disc appropriate treatment should be given (*see* Pain—Upper Limb, page 320)

SPECIAL INDICATIONS FOR TREATMENT

Headache associated with Increased Intracranial Pressure

Treatment is to be directed towards the underlying cause. Hypertonic solutions should be given with discretion, since their indiscriminate use may produce a serious state of cerebral hypotension and the appearance of acute cerebral symptoms. There are 3 methods of giving hypertonic solutions for the purpose of

by the last two methods may give temporary relief of symptoms in cerebral tumour

may be relieved by the subcutaneous injection of heroin hydrochloride, $\frac{1}{12}$ grain, together with hyoscine hydrobromide, $\frac{1}{150}$–$\frac{1}{100}$ grain

Headache associated with Low Intracranial Pressure

A low intraventricular pressure may be responsible for headache, a familiar occurrence following lumbar puncture. Cerebral hypotension may also complicate

symptoms arise, ventriculography should be carried out without delay (Puech and his colleagues, 1948)

Headache associated with Arterial Hypertension

pre

effe

recent onset, sedation should be tried. Sodium Amytal, 3 grains, is given 3–4 times daily for 2 consecutive days. Blood pressure levels are recorded at 2-hourly intervals

how long he stays awake The quality of sleep matters namely whether it is light or deep and whether it is disturbed by dreams or nightmares Lastly the patient must

sleep and roughly how many hours his patient sleeps *It may be that he has 6 or 7* hours of peaceful sleep and if he wakes refreshed it is justifiable to form the provisional opinion that the man (or woman) has had sufficient sleep If this opinion is given to the patient and if he is told at the same time that 6 or 7 hours of sleep is ample for some people and that this may be enough for him and indeed that some people live healthy and active lives on as little as 5 hours sleep he may be content The patient may not in fact be suffering from insomnia but from the fear of insomnia *and its supposed ill-effects* he might even be found to hold the erroneous opinion that his lack of sleep is due to mental unbalance or may cause it.

If on the other hand he does not wake of his own accord but is woken or if he wakes tired instead of refreshed it is evident that he has not had enough sleep and something needs to be done about it

FACTORS AFFECTING SLEEP

Habits before Bedtime

Sleep is a normal function of the brain and like other bodily functions it is *largely a matter of habit An individual who suffers from insomnia should go to* bed as a rule about the same time every night Habits are to a large extent conditioned reflexes It therefore conduces to sleep to observe a ritual before going to bed or before going to sleep The essence of this ritual is a divorce from worldly affairs and the day s events For any one suffering from insomnia it is advisable not to work after the evening meal nor to engage in any controversial discussion in the evening A definite distraction such as a novel or detective story or occupation *with some hobby may be the means to this end A drink of water or some* other fluid reading the evening paper or saying prayers are important items in the evening ritual that leads to sleep Prayer may be of especial value partly because it

Bedtime

The right time for going to bed is a matter of opinion *There is an idea that* the hours of sleep before midnight are especially restful so-called beauty sleep However this may be there is no doubt that there are many who go to bed too late (sometimes for the reason that they are slow in going to sleep) and so make their nights too short or by going to bed too late they are too tired to sleep Early to bed should be the rule A hot drink at bedtime or a glass of water and a biscuit may

is repeated until the vesicles are well healed Pituitrin ½–1 millilitre twice daily

grams each, daily.

SPECIAL INDICATIONS

Muscular Wasting

This will require physiotherapy when the acute stage has subsided.

Ophthalmic Herpes Zoster

The eye on the affected side should be protected by an eye-shade A few drops of paraffin should be instilled into the conjunctival sac twice daily Penicillin eye-drops should be used prophylactically, or if keratitis develops.

Post-herpetic Neuralgia

operative intervention may have to be considered

operation, namely prefrontal leucotomy, may be considered The pain is not abolished, but the patient's attitude to it is altered The patient's previous personality may be affected by the operation and relatives should be warned of this possibility

DOUGLAS McALPINE

INSOMNIA

DIAGNOSIS

When a patient complains of sleeplessness inquiry should first be made as to when he goes to bed, at what time he puts the light out and after what interval he goes to sleep Further inquiry is made as to whether he then sleeps through till morning, or if he wakes in the night, and if so how often and at what times, and for

patient should perhaps be advised to take a small and digestible evening meal, the possibility of alcoholic excess or idiosyncrasy should be inquired into, a simple drink of whisky and water may be the cause of disturbed sleep in one case, while in another it is a good night-cap and as effective in promoting sleep as 20 grains of sodium bromide

tur

so

are

A *common cause of intestinal dysfunction is irritation of the bowels by a laxa tive taken at bedtime* It is not necessarily harmful to take a laxative at bedtime, but it needs to be one that suits the patient, and one that does not cause wind, abdominal discomfort or a loose action of the bowels on waking If a patient is

Apart from organ dysfunction, pain and pruritus are among the most important causes of insomnia due to peripheral disturbance When pain is the disturbing factor it is to be remembered that it has two components, namely the sensation *itself and its emotional adjunct The commonest emotional adjunct to pain is fear* Pain may wake a patient from sleep and fear as to what it portends may keep him or her awake If a patient has pain after an operation, for instance, and knows that *it is to be expected or is told the reason for it—maybe that it is due to wind—he* will be satisfied that the operation has been well performed and when the pain subsides he is soon asleep again; but if he has the impression that the pain is an indication that something has gone wrong he will be kept awake by anxiety after the

ry severe, pro-

aspirin, 10–15

und tablets of

ine phosphate,

½ grain), one or two tablets For the control of severe pain, pethidine, Omnopon, morphine or heroin are required For the treatment of Pruritus *see* page 1199

CENTRAL (PSYCHOGENIC) DISTURBANCE

Worry is one of the commonest causes of insomnia It is an emotional distur-

the memory of events that are past or the anticipation of

he first step is the recognition of

nitial cause of the insomnia may

be found by inquiry as to the circumstances of the patient's environment, physical and *emotional, at the time of onset of the insomnia The* cause may no longer be operative and the insomnia may be simply an acquired habit It is possible to break

if the cause is persisting its nature may be

in the patient's mind before he goes to sleep or when he wakes in the night

encourage sleep The advice as to habits is often unacceptable to patients who suffer from insomnia, they may subconsciously be more anxious to have something done for them than to help themselves Nevertheless, detailed advice of the kind described should be given because insomnia is often due to a lack of discipline of the mind and the institution of a routine of physical habits before going to bed helps by reflex effect to condition sleep

EXTERNAL STIMULANTS

Cortical activity is in abeyance during sleep Cerebral stimulants, therefore, that is tea and coffee, should not be taken after supper In some cases these caffeine containing drinks must be given up altogether because tea drunk in the afternoon may interfere with sleep at night Nature takes great pains to prevent external stimuli reaching the cortex during sleep Thus the stimulus of light is shut out by contraction of the pupils, closing of the eyelids, contraction of the retinal vessels and, in most people, by a movement of the eyeballs upwards so that the pupils

morning Inquiry should be made as to the patient's bed, that it is comfortable, and as to bed-clothes, that they are sufficient for warmth and not so thick as to overheat the body Skin stimuli are just as potent as light and sound in disturbing or preventing sleep As further protection from disturbance from outside it is often advisable for the patient to sleep alone in a separate room

PERIPHERAL STIMULANTS

Any variety of bodily disorder may prevent or disturb sleep Rheumatic pains of all kinds belong to this order of events both because of the discomfort they cause and because they may prevent the patient lying in his accustomed posture The symptomatic treatment of rheumatic pains is with aspirin, 10–15 grains, taken at bedtime, in the form of 5 grain tablets which should be crushed before they are swallowed with a glass of water Disprin may be less irritating to gastric mucosa than aspirin One tablet contains aspirin 5 grains, calcium carbonate 1½ grains and citric acid ½ grain, the tablets dissolve quickly in water and the *p*H of the solution is about 4 5 Aspirin is more effective when given with phenacetin, *see* page 290

Occasional organ dysfunction is not an important cause of insomnia Patients with increased frequency of micturition up to 3 or 4 times in the night often sleep quite well They wake to pass urine and soon go to sleep again It is persistent organ dysfunction, particularly gastro intestinal disturbances which especially disturbs sleep The pain of duodenal ulcer or the discomfort of duodenal dyspepsia

aware symptomatically of his disorder For this reason particular inquiry should be made in all cases of insomnia as to digestive disturbance and if it is present in the day full account should be taken of its possibly disturbing sleep at night Thus the

Sonalgin, each tablet contains Soneryl 1 grain, codeine phosphate $\frac{1}{6}$ grain and phenacetin $3\frac{1}{2}$ grains Another combination is "Pulvule" Tuinal, containing Seconal Sodium $\frac{3}{4}$ grain and Sodium Amytal $\frac{3}{4}$ grain Medinal is often more effective when given

65 mi

same

well known hypnotic is Valitone Elixir. The dose is 1–4 teaspoonfuls an hour before sleep A teaspoonful contains soluble barbitone, $2\frac{1}{2}$ grains, and fluid extract of valerian, 3 *minims*

GEOFFREY EVANS

LIGHTNING EFFECTS

It has been computed by Brookes (1925) that 44,000 thunderstorms occur on this earth every day and that in any given second there are 100 flashes of lightning from 1,800 storms

Deaths from lightning are uncommon in Great Britain, in England and Wales the average number shown in the Annual Returns of the Registrar General is about 10 or 12 In other parts of the world the incidence is higher. In the United States of America the yearly death rate is about 400 In the tropics, thunderstorms are frequent and severe and deaths and injuries must be correspondingly greater Everywhere the number of injured is large in proportion to the number of deaths When an East African church was struck, only 6 of a congregation of 300 were killed though 100 were rendered unconscious

The victim of lightning stroke usually falls unconscious and remains insensible for a few seconds or minutes Retrograde amnesia is a common sequel and the moment of being struck cannot be remembered There may be temporary flaccid paralysis, generally affecting the legs and lasting a few hours Burns are the commonest injuries They are usually surface burns and may be bizarre in form and show as arborescent patterns or long lines, clothing is sometimes burnt, and metal objects in pockets or worn on the body may cause localized burns The force of the explosion may result in lacerations and fractures Uncommon sequelae are cataracts and a form of spinal atrophic paralysis resembling progressive muscular atrophy

TREATMENT

PREVENTIVE

In Great Britain the danger is small but in tropical countries precautions in thunderstorms are matters of importance

Buildings should be fitted with lightning conductors Benjamin Franklin was the inventor of the "lightning rod" (1748–52) and it was not the least of the contributions to the world made by the genius of this versatile American scientist, philosopher and statesman The construction of lightning conductors is not a matter for this work, reference should be made to the *Encyclopaedia Britannica*

In a thunderstorm it is safer to be indoors in a room with windows and doors closed and to avoid proximity to electric wiring, switches and radio sets fitted with external aerials (the lead-in wires should be earthed) Telephones are fitted with

In its simplest form, worry is due to an inability to make decisions, and a simple cause of indecision is mental or emotional fatigue Going early to bed at night and other measures to promote sleep already considered will in many cases restore sleep, and with recovery from fatigue the patient is able to solve or shoulder his difficulties In other cases the worry is a definite circumstance belonging to the past, present or future, and it is necessary to discuss it with the patient and isolate it as an event or circumstance distinct from its emotional content As an event or circumstance, something done or said or experienced, it is perhaps past The worry may stand alone or it may be connected with something in the more distant past. Such associations may require to be followed up and rationalized Thus, worries can be dealt with (a) by exposure and explanation, that is to say discussion between patient and doctor, the patient's role being to tell the tale and the doctor's to listen with understanding, (b) by acceptance, the equivalent of which to Christians is "*God's will be done*" (the Stoic philosophy as written by Marcus Aurelius teaches

ject insists on consideration, it is turned over and considered for a limited time,

vidual is sitting at a desk with pen and paper to record the several aspects of the matter and with a view to reaching a decision as to action then or at some later date In isolating a disturbing thought and giving it definition it is important to

and so restore his ability to sleep This power belongs to anyone with experi

are ages old, are muscle relaxation, regular deep breathing and human contact. For example, if husband and wife are all in all to one another and the man is seriously ill, even at death's door, he may sleep peacefully with his wife when other means to secure sleep have failed In other cases a change of environment, perhaps a holiday of 3 or 4 weeks or longer, is the best remedy, or the power of sleep may be recovered by the cultivation of new interests, such as taking up an old hobby, or furnishing the mind with new emotions derived from the society of friends, books, plays, music and paintings for educated persons, or football matches and racing for simpler natures Attention should be given to the day's routine so

use of M & B 693 were made During World War II the use, in the early stages of

of penicillin and its use alone or in combination with the sulphonamides greatly improved the outlook for the other types of pyogenic meningitis in which the causative organism was penicillin sensitive

DIAGNOSIS

Meningitis due to one of the pyogenic organisms may arise in one of the following ways (a) By direct spread from a neighbouring focus of infection, for example fractures of the base of the skull, penetrating wounds of the skull, mastoiditis infections of the paranasal sinuses, thrombosis of cerebral veins and intracerebral abscess, and (b) by blood stream infection, for example, bacteraemia and septicaemia

The diagnosis of meningitis depends on the history, the clinical findings and an examination of the cerebrospinal fluid Whatever the causative organism the fluid in the pyogenic forms of meningitis shows some degree of opalescence and contains an excess of polymorphonuclear cells and an increase in protein A stained smear may show the causative organism, but the fluid should be cultured as a routine

TREATMENT OF MENINGOCOCCAL MENINGITIS

Treatment should not be delayed pending the result of bacteriological examination Sulphadiazine and Sulphamezathine are the drugs of choice Two preparations of each are available tablets for oral administration each containing 0 5 gramme (7½ grains), and for intravenous use the sodium salt in ampoule form containing 1 0 gramme (15 grains) this is dissolved in 10 millilitres of distilled water or

average case of meningococcal meningitis in an adult the following doses should be given

First 24 hours	Initial dose 4 0–6 0 grammes orally, the larger dose being given in severe cases subsequently, 2 0 grammes 4-hourly
Second and third days	1 5–2 0 grammes 4-hourly
Fourth and fifth days	1 0 gramme 4-hourly
Sixth and seventh days	1 0 gramme 6-hourly

When using Sulphamezathine the larger doses should be given Each dose should be recorded in grammes on the temperature chart

These drugs occasionally produce toxic effects If an erythematous or morbilliform rash develops, an antihistamine substance may be helpful Sulphadiazine may lead to crystal formation in the renal tubules The risk of this complication is lessened if large quantities of fluids (4–5 pints in 24 hours) are given, with bicarbonate of soda, 20 grains (1 3 grammes) 4 hourly, making a total dose of 120

lightning arresters. Out of doors, shelter should be sought in a closed motor-car or in a shed, even a ditch It is advisable not to be near to wire fences, hedges, walls or solitary trees, though the middle of a wood is relatively safe.

CURATIVE

Unconscious patients with depressed respiration require artificial respiration and the administration of analeptics, of which nikethamide (Coramine), 5-10 millilitres intravenously, is the most suitable Artificial respiration may sometimes need to be maintained for hours. If the patient has extensive burns, plasma transfusion should be given, the amount being determined by the clinical response. It should not be less than 500 millilitres and may need to be much more (*see* Peripheral Circulatory Failure, page 246) The local treatment of burns, lacerations and fractures is in accordance with general surgical principles

H L. MARRIOTT

Abbott, C G (1934) *Smithsonian misc Coll*, 92, No 12.
Annotation (1944) *Lancet*, 2, 446
— (1946) *Ibid*, 1, 351.
Ashby, H T (1919) *Lancet*, 1, 307

MENINGITIS

PYOGENIC

HISTORICAL

siderably lowered At that time other forms of pyogenic meningitis almost invariably proved fatal With the introduction of M & B 693 in 1937 and its use either alone or with serum, the mortality rate from meningococcal meningitis prior to World War II dropped to between 10 per cent and 20 per cent. Furthermore, an increasing number of reports of recoveries from pneumococcal meningitis after the

[illegible]

per cent in the British and American Armies Finally, in 1943, the introduction of penicillin and its use alone or in combination with the sulphonamides greatly *improved the outlook* for the other types of pyogenic meningitis in which the causative organism was penicillin sensitive

DIAGNOSIS

[illegible] one of the follo[illegible]

infections of the paranasal sinuses, thrombosis of cerebral veins and intracerebral abscess, and (b) by blood stream infection, for example, bacteraemia and septicaemia

The diagnosis of meningitis depends on the history, the clinical findings and an examination of the cerebrospinal fluid Whatever the causative organism the fluid in the pyogenic forms of meningitis shows some degree of opalescence and contains an excess of polymorphonuclear cells and an increase in protein A stained smear may show the causative organism, but the fluid should be cultured as a routine

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First 24 hours	Initial dose 4 0–6 0 grammes orally, the larger dose being given in severe cases subsequently, 2 0 grammes 4-hourly
Second and third days	1 5–2 0 grammes 4 hourly
Fourth and fifth days	1 0 gramme 4-hourly
Sixth and seventh days	1 0 gramme 6-hourly

When using Sulphamezathine the larger doses should be given Each dose should be recorded in grammes on the temperature chart [illegible] or morbili[illegible]

[illegible] *lessened if large quantities of fluids (4–5 pints in 24 hours)* are given with [illegible] bonate of soda, 20 grains (1 3 grammes) 4 hourly, making a total dose of 120

grains (8 grammes) in 24 hours Sulphamezathine may be substituted for sulphadiazine if this renal complication threatens

In the severe forms of the disease namely acute meningo encephalitis and the [illegible]

be described

TREATMENT OF PNEUMOCOCCAL AND OTHER FORMS OF PYOGENIC MENINGITIS

As a rule, strains of the following organisms are sensitive to penicillin meningo [illegible]

Treatment falls under two headings (a) the treatment of the infection and (b) the treatment of the infective focus

Treatment of the Infection

[illegible]

Treatment of the Infective Focus

On admission to hospital, inquiry should be made for old or recent infection of the middle ear, nasal sinuses or of a focus of infection in the skull or elsewhere If a positive history is obtained, the case is likely to be one of pneumococcal or streptococcal meningitis therefore the necessary preparations for the administration of penicillin intrathecally should be made before the diagnostic lumbar puncture is performed, so that if inspection of the fluid or of a smear confirms the diagnosis, the first dose of penicillin may be given forthwith In the majority of cases treatment of the infective focus is indicated, therefore there should be close co operation [illegible]

Administration of Penicillin

Penicillin given systemically reaches the meninges in a low concentration therefore it must be given intrathecally as well as intramuscularly For intrathecal use the pure crystalline form of penicillin must always be used in order to reduce [illegible]

adequate concentration of the drug in the cerebrospinal fluid, with larger doses there is a danger of damage to the cauda equina Penicillin is injected slowly after about 6 millilitres of cerebrospinal fluid have been withdrawn The injection should

be interrupted by frequent aspiration of small quantities of cerebrospinal fluid, thus ensuring that the needle is correctly placed. The lumbar route is only effective when [illegible]

rate of 200,000 units 8-hourly or 300,000 units 12-hourly; and penicillin dissolved in oil, 2 doses of 300,000 units are given daily. The total dose of systemic penicillin should be at least 3,000,000–4,000,000 units, but more prolonged treatment may be necessary if signs of bacteraemia persist. Relapse is less likely if sulphonamide treatment is continued after cessation of penicillin.

Indications for intraventricular administration of penicillin

Penicillin may be prevented from reaching all infected areas by a number of causes, including blockage of the basal cisterns, by a shutting off of localized collections of pus, or by spinal subarachnoid block, in such cases intraventricular or cisternal administration of penicillin may be necessary. This form of treatment may cause a pleocytosis. After the completion of penicillin treatment intrathecally, a week should elapse before proceeding with a further lumbar puncture. The clinical condition of the patient will determine the necessity of further lumbar punctures.

ADMINISTRATION OF SULPHADIAZINE OR SULPHAMEZATHINE

As has been already emphasized, one of these preparations should be given at the earliest possible moment and its administration should be continued after the course of penicillin has ended. The same dosage should be employed as for the [illegible]

penicillin

GENERAL MANAGEMENT OF A CASE OF PYOGENIC MENINGITIS

In a severe case of meningitis skilled nursing is of great importance, particularly when the patient has to be fed by nasal tube. The patient should be nursed in a propped up position, fluid intake should be 5 pints or more in the 24 hours. The daily calorie intake should be not less than 2,000. In a comatose patient food should be given by intranasal catheter passed into the stomach, and should consist mainly of milk, eggs and glucose (*see* Brain—Injuries, page 263). Drugs may be given by the same route, or alternatively by intravenous drip should this be considered necessary in order to combat dehydration. An initial retention of urine may require catheterization, but subsequently incontinence is more usual in the [illegible]

RESULTS OF TREATMENT OF PYOGENIC MENINGITIS BY CHEMOTHERAPY

The following factors enter into the prognosis: the age of the patient, the stage of the disease at which treatment is instituted, the sensitivity or otherwise of the causative organism to the sulphonamides and to penicillin, and the standard of nursing care.

grains (8 grammes) in 24 hours Sulphamezathine may be substituted for sulphadiazine if this renal complication threatens

In the severe forms of the disease, namely acute meningo-encephalitis and the adrenal type (the Waterhouse Friderichsen syndrome), the intravenous route should be used for 48 hours, the initial dose being 4 grammes and the subsequent doses 1-2 grammes at 6-hourly intervals. Penicillin should also be given in the dosage to be described

TREATMENT OF PNEUMOCOCCAL AND OTHER FORMS OF PYOGENIC MENINGITIS

As a rule, strains of the following organisms are sensitive to penicillin meningococcus, pneumococcus, streptococcus and staphylococcus, and, to a less extent, ... of the

... m, and

(b) the treatment of the infective focus

Treatment of the Infection

Combined penicillin and sulphadiazine or Sulphamezathine treatment is essential As soon as meningitis is suspected, 4 0 grammes of sulphadiazine or Sulphamezathine should be given orally Lumbar puncture should be carried out as soon as possible afterwards but if there is a delay in getting the patient into hospital one of the above sulphonamides should be continued at the rate of 2 0 grammes 4-hourly

Treatment of the Infective Focus

On admission to hospital inquiry should be made for old or recent infection of the middle ear, nasal sinuses or of a focus of infection in the skull or elsewhere If a positive history is obtained, the case is likely to be one of pneumococcal or streptococcal meningitis, therefore the necessary preparations for the administration of penicillin intrathecally should be made before the diagnostic lumbar puncture ...

between the ear, nose and throat or general surgeon and physician Surgical treatment may be carried out as soon as a satisfactory response to chemotherapy is obtained or in other cases may be deferred until the stage of convalescence

Administration of Penicillin

Penicillin given systemically reaches the meninges in a low concentration, therefore it must be given intrathecally as well as intramuscularly For intrathecal use the pure crystalline form of penicillin must always be used in order to reduce ...

adequate concentration of the drug in the cerebrospinal fluid, with larger doses there is a danger of damage to the cauda equina Penicillin is injected slowly after about 6 millilitres of cerebrospinal fluid have been withdrawn The injection should

be interrupted by frequent aspiration of small quantities of cerebrospinal fluid, thus ensuring that the needle is correctly placed The lumbar route is only effective when the cerebrospinal pathways are patent. The precautions against secondary infection as described under Meningitis—Tuberculous (page 305) must be observed Con currently with intrathecal administration penicillin must be given intramuscularly Two preparations are available, an aqueous solution, which is given either at the *rate of 200 000 units 8 hourly or 300,000 units 12 hourly*; and penicillin dissolved in oil, 2 doses of 300,000 units are given daily The total dose of systemic penicillin should be at least 3,000,000–4,000 000 units, but more prolonged treatment may be necessary if signs of bacteraemia persist Relapse is less likely if sulphonamide treatment is continued after cessation of penicillin

Indications for intraventricular administration of penicillin

[illegible]

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ADMINISTRATION OF SULPHADIAZINE OR SULPHAMEZATHINE

As has been already emphasized, one of these preparations should be given at the earliest possible moment and its administration should be continued after the course of penicillin has ended The same dosage should be employed as for the treatment of meningococcal meningitis, except that during the sixth day onwards 1 gramme should be given 4 hourly for at least a week after the withdrawal of penicillin

GENERAL MANAGEMENT OF A CASE OF PYOGENIC MENINGITIS

[illegible] importance, particularly [illegible] t should be nursed in a [illegible] re in the 24 hours The daily calorie intake should be [illegible] comatose patient food should be given by intranasal catheter passed into the stomach, and should consist mainly of milk, eggs and glucose (*see* Brain—Injuries, page 263) Drugs may be given by the same route, or alternatively by intravenous drip should this be considered necessary in order to combat dehydration An initial retention of urine may require catheterization, but subsequently incontinence is more usual in the [illegible] to the skin is [illegible]

RESULTS OF TREATMENT OF PYOGENIC MENINGITIS BY CHEMOTHERAPY

The following factors enter into the prognosis the age of the patient, the stage of the disease at which treatment is instituted, the sensitivity or otherwise of the causative organism to the sulphonamides and to penicillin, and the standard of nursing care

hydrocephalus or focal signs arising from an arteritis or from the effects of damage to the roots of the cauda equina during treatment, recovery should be complete in patients who survive

Gordon, M H (1920) *Brit med J*, 2 423

TUBERCULOUS MENINGITIS

(*see also* Tuberculosis)

The introduction of streptomycin in the treatment of tuberculous meningitis has opened up the possibility of cure in a condition which previously had nearly always

passes upwards

(2) A tuberculous endarteritis Exudate and tubercles may be conspicuous along the course of the middle and anterior cerebral arteries and may lead to an endarteritis of these arteries or their branches, with a resulting hemiplegia or other focal signs

(3) A hypothalamic picture, this may result from exudate in the interpeduncular space

(4) A typical Korsakoff s psychosis, due either to hydrocephalus or to an arteritis

(5) Primary optic atrophy, the result of direct pressure by exudate on the optic nerve

(6) Ocular paresis

Formidable as these complications may be, complete or partial recovery from them and from ocular palsies is possible in patients who survive

DIAGNOSIS

The earlier the diagnosis is made and treatment begun the greater is the likelihood

in a patient known to be tuberculous then the diagnosis is reasonably certain Such a patient should at once be sent to a suitable hospital as an emergency case

(2) Ophthalmoscopic examination for the presence of choroidal tubercles

which forms in the fluid, gradually contracts down and remains suspended at the upper surface of the fluid The clot is separated by gently rotating the test tube and

1·100

reliable early diagnostic sign

TREATMENT WITH STREPTOMYCIN

after 6 months rehabilitation, that complications may arise during treatment and that the prospects of a cure are uncertain A decision as to whether an advanced case should be treated will depend mainly on the availability of proper facilities for streptomycin treatment

Method of Administration and Dosage

It is essential that streptomycin should be given intrathecally as well as by intramuscular injection

Intramuscular injection

For adults the dose is 2 0 grammes daily, at first divided into 4 doses and after a *few weeks in a single dose After about 4 months, if progress is satisfactory,* a single dose of 2 0 grammes is given every 48 hours For infants the daily dose is 0 02 grammes per pound body-weight Treatment by this route should continue for 6 months at least

Intrathecal injection

Streptomycin, like penicillin, can freely pass from the lumbar sac to the ventricle in the absence of spinal block or of an obstruction at the level of the cisterna magna Since treatment is carried out daily all possible precautions must be taken against a secondary infection Smith, Vollum and Cairns (1948) consider the following conditions obligatory

the rule rather than the exception Apart from rare cases showing sequelae such as hydrocephalus or focal signs arising from an arteritis or from the effects of damage to the roots of the cauda equina during treatment, recovery should be complete in patients who survive

Gordon, M H (1920) *Brit med J*, 2, 423

TUBERCULOUS MENINGITIS

(*see also* Tuberculosis)

The introduction of streptomycin in the treatment of tuberculous meningitis has opened up the possibility of cure in a condition which previously had nearly always proved fatal The effect of treatment in modifying the course of the disease has brought into prominence the following complications which were previously inconspicuous or absent owing to the short course of the illness

(1) A communicating hydrocephalus due to blockage by exudate of the narrow passage around the mid brain through which the cerebrospinal fluid normally passes upwards

(2) A tuberculous endarteritis Exudate and tubercles may be conspicuous along the course of the middle and anterior cerebral arteries and may lead to an endarteritis of these arteries or their branches, with a resulting hemiplegia or other focal signs

(3) A hypothalamic picture, this may result from exudate in the interpeduncular space

(4) A typical Korsakoff's psychosis due either to hydrocephalus or to an arteritis

(5) Primary optic atrophy, the result of direct pressure by exudate on the optic nerve

(6) Ocular paresis

Formidable as these complications may be, complete or partial recovery from them and from ocular palsies is possible in patients who survive

DIAGNOSIS

The earlier the diagnosis is made and treatment begun, the greater is the likelihood of a cure If a child or young adult has had for a week or less headache, vomiting and fever and has appeared listless, irritable and somewhat drowsy, a provisional diagnosis of tuberculous meningitis should be made If these symptoms occur in a patient known to be tuberculous then the diagnosis is reasonably certain Such a patient should at once be sent to a suitable hospital as an emergency case In addition to a routine physical examination, the following inquiries and investigations should be made, in the order indicated

(1) A history of tuberculosis in the patient, the family or of active tuberculosis in a contact

(2) Ophthalmoscopic examination for the presence of choroidal tubercles

GENERAL MANAGEMENT

The patient should be given a high protein diet Tube feeding may be necessary during the initial stages of treatment or during a later stage of mental confusion Details of this and of all other nursing measures that should be carried out are described under Brain—Injuries (*see* page 259) Intercurrent infection of the lungs or of the bladder will require appropriate treatment with sulphonamides and penicillin

RESULTS OF TREATMENT

The Medical Research Council's special committee on the streptomycin treatment of tuberculous meningitis report, *inter alia*, that out of 72 cases treated by combined intramuscular and intrathecal penicillin, 27 cases (37 per cent) were alive after 7 months or more (Medical Research Council, 1948) The survival rate was considerably greater in those above the age of 3 years Relapse occurred in a small percentage of cases and this possibility could not be excluded in others until after a further lapse of time The ultimate prognosis seemed favourable in the majority of those in whom the cerebrospinal fluid had returned to normal From this and other reports it would appear that early diagnosis of tuberculous meningitis, followed by prolonged streptomycin treatment, alone or with the aid of adjuvants, backed up by neurosurgery, should mean a rising recovery rate in tuberculous meningitis

Canti, R G (1925) *St Bart's Hosp med Rep*, 58 33.
Medical Research Council (1948) *Lancet*, 1, 582
Smith Honor, Vollum R L, and Cairns H C L (1948) *Lancet*, 1, 627

MIGRAINE

Migraine is the local expression of a disturbance of the autonomic system due to a

suffered from a feeling of insecurity in childhood for which he compensates by meticulous attention to detail, hard work and constant endeavour to keep ahead of his fellows, qualities which distinguish many leaders in various walks of life Eager to succeed he becomes easily frustrated if individuals or events interfere with his goal A state of tension may also be produced by any new situation or by the anticipation or realization of any event which is foreign to his daily routine Fatigue is an additional factor in precipitating an attack, as also are meals that are hurried and irregular, and commitments outside normal working hours

TREATMENT

aware of situations in his life which tend to increase tension, he may be persuaded to take a more philosophical view of them Mental and physical hurry must be reduced—advice which under present conditions is more easily given than carried into effect Adjustments in daily routine will be necessary, meals should be regular

(1) All instruments are sterilized by autoclaving All glass syringes should be used

(2) The operator wears a mask, does not scrub up surgically but uses a strict "no-touch" technique

(3) Two agents are used for tending the skin Cetavlon and perchloride of mercury No dressing is applied after lumbar puncture, since this tends to produce a dermatitis

(4) The quantities of streptomycin solution required for single injections are put into separate containers so that each container is used once only

(5) All solutions for intrathecal use are sterilized by Seitz filtration

The daily dose for an adult is 0 1 gramme for the infant 0 05–0 078 gramme

Intrathecal administration by the lumbar route is carried out daily for 6 weeks, further treatment may be indicated by the changes in the cerebrospinal fluid (*see* below)

[illegible]

means of a special tube placed in position after a transfrontal operation

Toxic Effects of Streptomycin

Vomiting is not unusual after some weeks of treatment as a rule it is not a serious complication, but occasionally it may signify a hydrocephalus Giddiness may be a pronounced symptom Moderate high tone deafness, detectable only by audiometry and an absence of the normal caloric responses are more or less constant findings A degree of ataxia is not uncommon during the first few weeks of convalescence

Cerebrospinal Fluid Changes

A detailed examination of the fluid should be made at least once weekly during intrathecal treatment, and thereafter weekly for a further 3 months If the fluid is then still abnormal lumbar puncture should be carried out at intervals until it [illegible]

normal for a year or more from the date of commencement of treatment

Streptomycin assays should be carried out periodically In the early stages of [illegible]

treatment

Treatment should not be abandoned until 2 consecutive weekly specimens of fluid are free from tubercle bacillus, and show a cell count and protein content which is nearly normal In addition the streptomycin level, on a daily dose of 2 0 grammes, should not exceed 1 microgram per millilitre.

In cases of arteriosclerosis, ergotamine tartrate should be used with care For such patients Gower's mixture may be a helpful substitute

Sodium bromide	10 gr	0 6 g
Glyceryl trinitrate . .	1 min	0 06 ml
Solution of strychnine hydrochloride	5 min	0 3 ml
Tincture of gelsemium	10 min	0 6 ml
Dilute hydrochloric acid .	10 min	0 6 ml

MUSCULAR ATROPHIES AND DYSTROPHIES

The three groups of cases the treatment of which will be described are syringo myelia, the atrophies included under the term motor neurone disease, namely, progressive muscular atrophy, progressive bulbar palsy and amyotrophic lateral sclerosis, and the muscular dystrophies The treatment of other forms of atrophy is similar.

SYRINGOMYELIA

The character of the underlying changes in the spinal cord or medulla, namely gliosis and cavitation, are by their nature unlikely to be radically altered by any form of treatment. Nevertheless, x-ray treatment of the cervical and dorsal cord

[illegible]

injuries to the skin of the fingers and from burns, with care a patient may avoid [illegible] require the use of analgesics Mus- [illegible] by exercises and massage, and in [illegible] of cases in [illegible]

pain

MOTOR NEURONE DISEASE

The cause of the changes in the motor cells of the spinal cord and lower cranial nerves is unknown and presents a *problem that is in urgent need of investigation* In an atypical case the blood Wassermann reaction and the cerebrospinal fluid should be examined in order to exclude syphilis There is no known treatment that *will retard the progress of the disease Claims have been put forward* in support of vitamin E in the treatment of the spinal amyotrophies, but the majority of reports do not support them

The measures to be taken in the treatment of a case are very limited in their scope and are chiefly dictated by common sense Activities should only be limited in so far as they cause fatigue Massage, combined with active and passive movements,

and unhurried and they should be spaced so that some nourishment is taken every 3 hours during the day. For the overworked housewife a less conscientious attitude towards the home should be encouraged along with a spreading of interests outside the home Additional help in the house and a rest on 2 or 3 afternoons in the week, will do much to reduce the probability of an attack. Any error of refraction should be corrected

DIETETIC

As a rule a migrainous subject does not tolerate fats well If a dietetic inquiry shows a relationship between headache and certain articles of food, then these

MEDICINAL

The 3 drugs that are of real value in the treatment of migraine are phenobarbitone,

(*B P*) (Femergin) a vaso-constrictor, counteracts the secondary stage of vasodilatation in migraine The following preparations are available for oral administra-

solution in water may be taken orally either at night or in the morning over long

ergotamine tartrate and ergometrine may prove of more value than either drug alone. Neo-Femergin is prepared in the form of a tablet, in solution, and in an ampoule. Each contains 0 125 milligram of ergometrine tartrate and 0 25 milligram of ergotamine tartrate The dosage is similar to that already described The view has been put forward that in some migrainous subjects water retention

possibility of an allergic factor, then an antihistamine substance should be given, such as Anthisan one to two, 100-milligram tablets at night, or Phenergan one to two 25-milligram tablets at night.

1934, Dr Mary Walker, working in a London County Council hospital, was struck by the resemblance between the muscular weakness in myasthenia gravis and that observed in cases of curare poisoning She successfully treated a case of myasthenia gravis with physostigmine, a drug known to possess anti-curare properties Subsequently a synthetic preparation of physostigmine was produced under the name of Prostigmin, since 1935, this has been the standard drug in the treatment of myasthenia gravis

Thymectomy was performed for the first time in 1912 by Sauerbruch, the case being reported by Schumacher and Roth During the last decade this operation has

TREATMENT

Previously untreated cases, whether early or late, should be admitted to hospital for complete rest, investigation and stabilization of treatment. The last mentioned falls under three headings medicinal, thymectomy, and irradiation of the thymus gland

Medicinal

Careful note should be taken of the symptoms and signs present on two or three consecutive evenings after admission to hospital A photographic record is of value

of Prostigmin, one tablet contains 15 milligrams of Prostigmin The dose may vary from 3 to 20 tablets daily When there is difficulty in swallowing one dose (1–3 tablets) should be given half an hour before each meal In cases in which there is respiratory distress or marked dysphagia, it may be necessary to supplement the oral dose by 2 or 3 subcutaneous injections daily of Prostigmin (1 5 or 2 5 milli

patient s activities in the ward should be graded and the doses of Prostigmin adjusted so as to allow a fair range of activity on leaving hospital In cases requiring Prostigmin by injection, the patient should be taught the use of a syringe After leaving hospital any unusual effort will necessitate an additional dose of the drug

Indications for Thymectomy

As far as the surgical treatment of myasthenia gravis is concerned the present attitude towards the thymus gland is somewhat similar to that held in respect of the

has a place in the later stage of the disease Faradic stimulation, as long as it is mild, can have no deleterious effect and may serve a psychological purpose Bulbar

taining porridge, eggs, fish, minced or *purée* meat and chicken, potatoes vegetable *purée*, and stewed fruit is suitable Towards the terminal phase of a bulbar palsy, feeding by nasal tube will be necessary Accumulations of mucus in the back of the throat may be lessened by tincture of belladonna, 7 minims 3 times a day A compound vitamin tablet may be given as a general tonic, while phenobarbitone, ½ grain 3 times a day, will help to allay anxiety

MUSCULAR DYSTROPHIES (MYOPATHIES)

In the absence of a knowledge of the underlying change in the muscles, no effective treatment for muscular dystrophies is available Glycine in doses of 10-20

taught some form of occupational therapy In myotonia atrophica, beyond lessening myotonia by means of quinine sulphate, 10 grains thrice daily, no treatment other than that just mentioned is available Rarely, thyrotoxicosis is associated with a form of muscular wasting which may either resemble progressive muscular atrophy or a myopathy The effective control of the hyperthyroidism may result in arrest or improvement of the atrophic process

MYASTHENIA GRAVIS

DEFINITION

Myasthenia gravis is a chronic disease characterized by abnormal fatigability of muscles and ultimately by established paresis The condition is due to faulty transmission at the myoneural junction, caused by the presence of an unknown substance

seventh decade Spontaneous remissions are not uncommon

HISTORICAL NOTE

Until 1930 the treatment of myasthenia gravis was mainly palliative In the

NEURALGIA: TRIGEMINAL

AETIOLOGY

Trigeminal neuralgia (tic doloureux) remains a clinical entity of unknown origin The majority of patients are in the fourth or fifth decade Its occasional association with dental infection and more rarely with infection of the antrum and

member of a family is affected

CLINICAL PICTURE

The essential feature of trigeminal neuralgia is the paroxysmal character of the pain A sudden sharp excruciating stab or wave of burning pain is felt in the lower

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ating

oise

Attacks may recur during one or more days causing a degree of mental stress that is rarely exceeded by any other type of painful disease No sensory reflex or motor changes are found within the distribution of the trigeminal nerve unless the patient *has had a previous alcohol injection*

DIAGNOSIS

When a patient complains of pain in the distribution of the first division of the fifth nerve trigeminal neuralgia is seldom the cause unless there is a clear history of the condition having previously affected one of the lower branches Pain due to an

constant

dental caries or by an apical infection Severest pain may be caused by pu p under a dental filling The pain is more persistent and does not have the short sharp

h a metal probe

distribu

ion such

ganglion

individuals with a

he region of the eye

The pain may radiate

down into the cheek and upwards into the forehead Such attacks of migrainous neuralgia may last a few days or a few weeks with free periods The precipitating factors that are so characteristic of trigeminal neuralgia do not occur in this condition In migrainous neuralgia ergotamine tartrate and phenobarbitone may give relief If this treatment fails injection of the infra orbital nerve or of the inner part of the Gasserian ganglion with resultant anaesthesia in the first and second divisions of the fifth nerve may prove successful (Harris 1946) Lastly, constant discomfort or actual pain in the face especially when bilateral should in the absence of positive signs suggest a psychogenic origin

thyroid gland in exophthalmic goitre 25 years ago At that time the oper partial thyroidectomy had not been perfected and the mortality rate was high in the hands of a few, in consequence, deep x ray treatment was the meth choice In experienced hands, however, the operation of thymectomy now mortality rate below 5 per cent

The best results are seen in young adults in whom the operation is carried within a year of the onset of symptoms, in the majority of these patients the sy toms are completely or partially relieved A small maintenance dose of Prostigr may be necessary

If the degree of muscular weakness is severe enough to interfere with the prope use of the eyes or of the muscles of mastication, speech or swallowing, or is associ ated with a degree of general fatigability that prevents the patient leading a norma life, and unless such symptoms are relieved by moderate doses of Prostigmin, thymectomy is indicated A further argument in favour of early thymectomy is the uncertainty that always exists with regard to prognosis If a thymoma is found, the prognosis is poor, but irradiation of the thymus gland may prolong life When the stage of permanent paresis is reached the results of operation are often disappointing, particularly in the middle-aged

INDICATIONS FOR RADIOTHERAPY

Irradiation is indicated in cases unsuitable for operation The exposure should cover a wide field so as to include any outlying islets of thymic tissue Dosage must be carefully adjusted so as to prevent permanent effects on neighbouring tissues such as the lung

Edgworth Harriet (1930) *J Amer med Ass* 94 1136.
Pierchella, L. (1921) *Ther Mh (Halbmh)* 35, 504
Schumacher E. D, and Roth (1912) *Mitt Grenzgeb Med Chir*, 25, 746
Walker, Mary B (1934) *Lancet*, 1, 200

NARCOLEPSY

The irresistible attacks of sleep which characterize narcolepsy may be associated with cataplexy a condition in which the patient momentarily loses power, partially or completely, but retains consciousness Cataplexy is usually precipitated by a strong emotional stimulus such as laughing whereas narcoleptic attacks may come on spontaneously at any time of the day Narcolepsy may be a sequel of epidemic encephalitis or of a severe head injury If a history of these is not obtained, and if from the history and results of investigation, syphilis and a tumour in the region of he hypothalamus can be excluded, the case should be labelled as one of idiopathic arcolepsy If a choice of occupation is possible an outdoor country life should be osen Car driving should be prohibited since attacks of sleep may come on ddenly and the individual may be powerless to resist them. Amphetamine phate in 5 milligram tablets should be given, 2–3 tablets after breakfast and a lar dose after the mid-day meal Ephedrine hydrochloride, ½ grain, is also of e in this condition

Pain is relieved permanently Precautions against a keratitis must be taken following both operation and alcohol injection.

Harris, W (1912) *Lancet*, 1, 218
— (1931) "Trigeminal Neuralgia and its Treatment" *Ibid*, 1, 567
— (1946) "Migrainous, Ciliary and Post traumatic Dural Headaches" *Brit med J*, 1, 754

PAIN—LOWER LIMB

There has been a revolutionary change of attitude in the last 20 years towards the commonest form of pain in the lower limb, namely sciatica Formerly a number of diverse aetiological factors were invoked in order to explain the cause of sciatic pain *These ranged from anatomical alterations or functional disturbances of the* lower spine to fibrositis or neuritis of the roots of the lumbo-sacral plexus It is now generally recognized that the majority of cases of so-called primary sciatica are due to a prolapse of one of the two lower lumbar intervertebral discs Although this condition is the commonest cause of chronic pain in the lower limb, careful consideration must be given to other causes, particularly when the history is atypical or pain is not referred to the sciatic distribution Amongst these conditions may be mentioned primary malignant disease in the pelvis and secondary deposits of car

system, the spine, the peripheral arteries, the urine and the rectum or cervix An x ray examination of the lumbar spine and pelvis and, in certain cases, lumbar puncture will also be necessary

NEURITIS OF THE EXTERNAL CUTANEOUS NERVE OF THE THIGH, MERALGIA PARAESTHETICA

In this condition pain and paraesthesiae are referred to the outer aspect of the thigh The condition is common in middle-aged men, but it may also occur in women as a result of direct pressure on the nerve by the lower edge of a corset Similarly a plaster jacket may be responsible for this variety of pain It is aggravated by walking and is usually due to a constriction of the nerve as it passes through the fascia lata *Tenderness is marked at this point Diabetes mellitus should* be excluded as well as any other cause

TREATMENT

The condition usually responds to rest If there is a gouty diathesis this should be treated Ultra short wave diathermy may be helpful A mixture containing potassium iodide, 10 grains, and sodium salicylate, 10 grains, may be given If these measures fail an alcohol injection of the nerve may give relief In other cases avulsion of the nerve may be necessary

TREATMENT

washed out in doubtful cases Attention to general health is important The

MEDICINAL TREATMENT

This must be given proper trial in every case, alcohol injection or operation should only be considered if the interval between attacks is short and if other measures have failed These procedures should not be discussed with the patient in the early stages of the complaint

In mild cases ½ fluid ounce 3 times daily of the following mixture may relieve pain

Potassium bromide	10 gr	600 mg
Tincture of gelsemium	10 min	0 6 ml
Phenazone	7 gr	450 mg
Water	½ fl oz	15 ml

When the pain is more severe a powder containing aspirin, 10 grains, amido-

times indicated

ALCOHOL INJECTION

An alcohol injection, whether of one of the branches of the nerve or of the gang-

at the foramen ovale, either by the horizontal lateral approach or by the ascending

successful attempts to inject the ganglion.

SURGICAL TREATMENT

In mild cases of sciatic pain due to a prolapsed intervertebral lumbar disc, bed rest may be omitted if a plaster cast is fitted This should be worn for a period of 3-6 months and may be replaced by a corset Provided measures are taken to obtain fixity of the lower spine, improvement or complete relief may follow

Operative

As already emphasized, conservative treatment will, in the majority of cases, alleviate pain either in the back or in the lower limb if the pain is due to a prolapsed intervertebral disc Operation should only be considered in patients in whom there has been a number of disabling attacks of pain, or when conservative treatment, carried out over a sufficiently long period, is ineffectual or is soon followed by a relapse The technique of the operation is important, for this reason it should come within the scope of the neurosurgeon rather than of the orthopaedic or general surgeon A recurrence of pain following operation is due either to failure on the part of the surgeon to remove the whole of the prolapsed disc, or to the existence of a second prolapse either below or above the original one, but if the technical difficulties of the operation are understood, permanent relief of pain should follow in the majority of cases

OTHER CAUSES OF LOWER LIMB PAIN

An interstitial neuritis of the spinal roots or of the sciatic nerve may be associated with an osteoarthritis of the lumbar spine or hip joint The condition is best treated by rest, sedatives and an appropriate form of physiotherapy The pain of intermittent claudication will require treatment of the underlying cause (*see Thrombo angiitis Obliterans, page 235*) A causalgic type of pain may follow injury to the internal popliteal nerve Relief may be obtained by lumbar sympathectomy (*see* Pain—Upper Limb)

Bradford, F K and Spurling, R G (1941) *The Intervertebral Disc* Springfield, Ill, Thomas
Fulconer, M A, McGeorge, M, and Begg, A C (1948) *J Neurol Neurosurg Psychiat*, 11, 14
O Connell, J E A (1943) *Brit J Surg*, 30, 315

PAIN—UPPER LIMB

Many causes of pain in the upper limb are now known Successful treatment is largely dependent on accurate localization, not only of the site of the pain, but also of its underlying pathology In considering treatment it is necessary to make a brief reference to the various conditions which are known to cause upper limb pain

DIAGNOSIS

Pain in an arm should not be labelled merely as neuritis An attempt should be made to discover its origin Such conditions as arthritis of the shoulder joint and [illegible] of the [illegible] and [illegible] may lead to an accurate diagnosis The following is a list of the common conditions which may cause pain referred to an upper limb

ANTERIOR FEMORAL NEURITIS

Pain and numbness are referred to the front of the thigh and occasionally down the inner aspect of the lower limb in the distribution of the saphenous branch There may be weakness and wasting of the quadriceps muscle, with sensory loss in the front of the thigh and diminution or absence of the knee jerk The underlying cause should be sought and treated Two common causes are a prolapsed intervertebral disc (L3–L4) and diabetes mellitus

TREATMENT

PROLAPSED LUMBAR INTERVERTEBRAL DISC

The importance of trauma in the causation of prolapsed lumbar intervertebral disc has, in the past, been over emphasized, although it may be the chief factor when the condition arises in young persons Of more importance in the middle-aged is the effect of recurring stress and strain on a degenerated disc The disc between L4 and L5 vertebrae and the lumbo sacral disc, causing compression of L5 and S1 roots respectively, are especially liable to prolapse The essential pathological basis of this condition is compression of the root in its extrathecal course, and

trally placed disc Prolapse of the L3–L4 disc may cause low back ache and pain referred to the anterior femoral distribution

TREATMENT

Conservative

The majority of cases respond to rest provided this is carried out thoroughly and with intelligence The object of treatment should be to ensure relief of pressure on affected nerve roots, this is best carried out by complete bed rest A firm mattress placed on fracture boards and a small firm pillow under the lower part of the back will ensure the necessary degree of lordosis of the lumbar spine Visits to the toilet must be forbidden The patient may turn on his side for meals The head of the bed may be supported on 12 inch blocks in order to facilitate reading When the pain is severe, analgesics such as those used for the relief of pain in the upper limb (*see* page 321) must be freely given in order that the patient may co-operate in maintaining a correct posture In the great majority of cases the pain progressively diminishes after the first week The *maintenance of this position in bed for a month* is necessary When the patient is allowed up the necessity of maintaining an extended position of the lower spine must be explained to him He should be instructed to bend his knees instead of his back when picking up an object from the ground Rehabilitation under the direction of a physiotherapist is desirable Correct posture can be more effectively produced by some method of mechanical immobilization of the lower spine, a well fitting corset of the Spencer type with steel ribs may suffice

In the acute stage of brachial neuralgia the appl[illegible]

patient may be allowed up, the arm being carried in a sling This position will inevitably lead to the formation of adhesions at the shoulder joint, particularly in the elderly, unless steps are taken to counter them. Therefore, as soon as the acute pain has subsided, passive movements of the shoulder through a full range must be encouraged until the patient can lift his arm vertically upwards

BRACHIAL NEURITIS

[illegible]

the region of the shoulder or scapula or, less often, to the arm, is followed by loss of power and marked wasting, usually of one or more muscles of the shoulder girdle, less commonly of the upper limb, winging of the scapula is common Constitutional symptoms are absent at the onset The residual paralysis may be severe The condition may simulate acute poliomyelitis, and treatment should be along lines similar to those described in the treatment of this condition (*see* page 334)

NEURITIS OF INDIVIDUAL PERIPHERAL NERVES

Trauma, pressure, or a toxi-infective process may cause pain followed by motor or sensory loss in the distribution of any of the three nerves supplying the upper limb A history of pressure is usual in radial nerve palsy. Similarly, the ulnar nerve may be compressed at the elbow Attention has been drawn recently to a neuritis of the median nerve arising as the result of compression as the nerve runs through the carpal tunnel at the wrist Finally, pressure on the terminal branches of either the median or ulnar nerve in the hand may result from certain occupations

Treatment

The three principles of treatment are (a) ascertainment of the cause, (b) rest, and (c) treatment of the paralysis and maintenance of correct posture Light splints may be necessary Massage and faradism or galvanism followed by exercises will be indicated if there is muscular weakness or wasting In neuritis of the ulnar nerve, when there is evidence suggesting a traumatic cause, or when the ulnar groove is shallow, transposition of the nerve to the front of the elbow may be necessary When the history and findings suggest the possibility of compression of the median nerve in the carpal tunnel, decompression of the nerve is necessary in order to obtain relief The result will depend on the degree of paralysis and wasting prior to operation, but as a rule pain and paraesthesiae are relieved

CAUSALGIA

Causalgia is a not uncommon sequel to wounds involving certain peripheral nerves, but it is rarely met with in civilian practice Partial lesions of the median and

(1) Intramedullary or extramedullary tumour of cervical cord, herpes zoster, acute poliomyelitis, syringomyelia, syphilitic amyotrophy

(2) Disease or injury of the cervical spine, such as Pott's disease, fracture-dislocation, prolapsed cervical disc, spondylitis, secondary carcinomatous deposits, Pancoast's tumour

(3) Traumatic lesions of the brachial plexus

(4) Costo-clavicular syndrome (including cervical rib)

(5) Brachial neuralgia and neuritis

(6) Lesions of the peripheral nerves supplying the upper limb, including causalgia

majority of cases of prolapsed disc, spondylitis and secondary deposits (b) Lumbar puncture, the result of Queckenstedt's test should be recorded, as well as the cerebrospinal fluid findings

AIMS OF TREATMENT

The aims of treatment should be the treatment of the underlying cause, relief of pain by rest, analgesics and other measures, the prevention of joint changes in the affected limb and the treatment of any paralysis that may be present

PROLAPSED CERVICAL DISC

Although the relationship between brachial neuralgia and prolapsed cervical disc is perhaps not so intimate as that between sciatica and a prolapsed lumbar disc, there can be no doubt that abnormalities of the cervical discs and intervertebral joints are a common cause of pain in the region of the shoulder and arm A history of trauma is relatively uncommon in these cases particularly in the middle-aged but spondylitis with osteophytic overgrowth is a frequent accompaniment These changes occur most commonly at the level of C5–C7 vertebrae A single nerve root may be compressed, not uncommonly a disc is protruded centrally, and in addition to root signs there may be evidence of compression of the spinal cord The onset of root pain or of paraplegia may be abrupt or gradual When root C6 or C7 is

and over the upper chest The pain is shooting or burning in character and is

Kremer, 1945, Brain, 1948a and b)

Physiotherapy

Exercises graded according to the age of the patient and the degree of disability are of considerable value in maintaining activity and morale, when possible they should be carried out under the direction of a physiotherapist

hi

re

patient of the rheumatic pains for which limitation of joint *movement is often* responsible

Medicinal

3 times daily, the dose of stramonium being increased if necessary In the post encephalitic form of Parkinsonism this drug is also used, the initial dose should be 20 minims 3 times daily, increasing up to 50 minims or more thrice daily in severe cases Stramonium may also be given in the form of a pill, extract of stramonium, 1 grain, 5–8 times daily In Parkinsonism, hyoscine hydrobromide,

but in others phenobarbitone, ½ grain thrice daily, is of some value In advanced cases of Parkinsonism, amphetamine sulphate 5–15 *milligrams in the morning* should be given a trial it lessens depression and may have some effect on akinesia

Recently a series of antispasmodic compounds with an atropine-like action have been given a trial in the treatment of paralysis agitans The advantages claimed for these preparations are that they give relief comparable to that afforded by the belladonna group of drugs, at the same time producing less side-effects (Dunham and Edwards 1948, Doshay and Constable, 1949, Corbin, 1949) Dosage is important *if unpleasant symptoms such as nausea,* giddiness, blurring of vision and, more rarely, mental confusion and agitation are to be avoided Therefore, administration of these new drugs, particularly in the early stages of treatment, requires careful supervision Parpanit has a complicated formula (1-phenyl-cyclopentane-1-carb-

...strengths of tablets are

...sists of six of the

...of the first week

...dose lies between

...six times daily

Diparcol has a somewhat similar formula (β-diethylaminoethyl N phenthiazine *hydrochloride) There are two strengths of tablets* 50 milligrams and 250 milli

sciatic nerves, in particular, may be followed within a short time by burning pain which, by its intensity and persistence and the ease with which it is aggravated by movement, touch or emotion, soon leads to much physical and mental distress [illegible]

TREATMENT

A sympathetic block by means of an injection of procaine into the stellate ganglion usually affords instant relief If successful, sympathectomy should be performed without further delay The sooner this method of treatment is put into effect the greater the likelihood of a cure A subsequent operation on the affected peripheral nerve may be indicated for other reasons

Brain, W R (1948a) *Lancet*, 1, 393
— (1948b) *Proc R Soc Med*, 41, 509
Elliott, F A, and Kremer, M (1945) *Lancet*, 1, 4
Spurling, R G, and Scoville, W B (1944) *Surg Gynec Obstet*, 78, 350
Walshe, F M R, Jackson, H, and Wyburn-Mason, R (1944) *Brain*, 67, 141

PARALYSIS AGITANS

[illegible]

the patient is 50 years of age is almost invariably due to a previous attack of en- [illegible]

nature, but may in some cases have a primary vascular origin

TREATMENT

This will be discussed under the following headings.

Psychological

In paralysis agitans the patient's attention is first drawn to the tremor and later to difficulty in writing and slowness in movements It may occur to him that he is [illegible]

disease.

the necessity of examination of the blood and of a test meal In certain cases of paraplegia, the situation of the lesion may be clear, but its nature remains obscure In such cases the result of Queckenstedt's test and of an examination of the cerebrospinal fluid may point to the need of a skiagram of the spine and myelography, since the importance of excluding compression of the cord cannot be exaggerated

TREATMENT

The treatment of paraplegia is twofold (i) treatment of the cause whenever possible, and (ii) treatment of the paraplegia and its complications

PARAPLEGIA OF SUDDEN ONSET

The commonest causes of paraplegia of sudden onset are (i) a fracture-dislocation of the spine with compression of the cord, (ii) an acute myelitis, and (iii) acute poliomyelitis *(see page 333)*

Fracture-dislocation of the spine with compression of the cord

The patient should be transported to hospital in the supine position, care being taken to maintain the natural curvature of the lumbar spine by means of a small

blankets and pillows On arrival at hospital the degree of paraplegia should be noted and the level of the lesion determined by the reflex changes and by the uppermost *level of sensory loss as determined by a dragged pin If retention of urine is present,* ... h ch the bladder was last emptied

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attempted under the supervision of an orthopaedic surgeon An exception to this rule is a fracture-dislocation of the cervical spine when traction by means of a head caliper should be applied Lumbar puncture should be carried out to determine the presence or absence of block

Acute myelitis

Blood should be taken for a Wassermann reaction and the cerebrospinal fluid should be examined If cells and protein are increased and if the history or eye examination suggests syphilis, treatment should be started at once (*see* Syphilis of the Nervous System, page 344)

TREATMENT OF THE ACUTE STAGE OF PARAPLEGIA AND ITS COMPLICATIONS

Recovery from an acute paraplegia due to compression or a myelitis depends on ... the degree of ... es or bladder,

and (iv) the standard of rehabilitation

General management

The patient should be nursed lying on his back on a Dunlopillo mattress or a water bed placed on fracture boards A bed which can be raised at the top has

grams The dose is gradually increased from 50 milligrams thrice daily to 250 mill
grams four times daily

Trihexyphenidyl or Artane is given in 1-milligram doses four times daily, and if necessary is gradually increased In the average case a dose of 6–10 milligrams a day is sufficient, though in some patients it may be necessary to give as much as 15–20 milligrams A combination of tincture of stramonium and one or other of these new drugs may be more effective than any of them alone

Helpless patients will have to be fed and
provided if walking is
bedridde
of the li
if a physi
a wireles
adjustable back rest, books, a nurse
ake the severe stage of the disease more tolerable

Corbin, K. B (1949) *J Amer med Ass*, 14 377
Doshay, L. J , and Constable K (1949) *J Amer med Ass* 140, 1317
Dunham, W F , and Edwards, C. H (1948) *Lancet*, 2, 724

PARAPLEGIA

There is no treatment which requires a higher degree of skill and patience from doctor, physiotherapist and nurse than does that of paraplegia Formerly little attempt was made to treat the severely paralysed patient and to prevent the final bedridden state During World War II, both in Great Britain and in the United States of America, a more realistic attitude was taken towards the problems, medical, urological and psychological, presented by these patients At the Ministry of Pensions' Hospital at Stoke Mandeville, Buckinghamshire, rehabilitation of paraplegics, particularly those suffering from lesions of the cauda equina and from low cord poliomyelitis has enabled many of them to walk, though severely paralysed Even patients with a severe lesion of the spinal cord in the thoracic or lower cervical region have been restored to a useful wheel-chair life As a result of vocational training during their stay in hospital, some of these men are earning their own living in or near their homes or in permanent settlements and institutions Although these cases were mainly traumatic in origin, the same attitude should be taken towards the civilian paraplegic

DIAGNOSIS

Since treatment of paraplegia is to a large extent concerned with the underlying cause, a brief reference must be made to broad principles of diagnosis Paraplegia may be due to (i) hysteria, (ii) spinal cord disease or trauma (iii) lesions of the cauda equina, (iv) acute poliomyelitis (v) polyneuritis, or (vi) lesions near the leg motor area, for example, parasagittal meningioma, injuries or thrombosis of the superior longitudinal sinus congenital diplegia (Little's disease) A diagnosis is arrived at by a careful consideration of the history and clinical findings, if necessary with the help of routine investigations The history alone may be decisive, as in disseminated sclerosis Pupil changes may indicate a syphilitic origin Symptoms and signs may point to subacute combined degeneration of the spinal cord and to

Superficial ulcers—The surface of the ulcer should be scraped and the border excised, this is followed by the application of daily dressings of saline or alternatively a penicillin solution or 0 3 per cent copper sulphate solution

Deep ulcers—Necrotic tissue should be excised and the wound cleansed with hydrogen peroxide and saline solution Sores infected with *Streptococcus haemolyticus*, staphylococci, *Bacillus proteus* and *B coli* should be treated with flavazole powder and penicillin powder for a few days, followed by saline dressings, at first twice, and later once, daily In addition a course of intramuscular penicillin should be given When *Ps pyocyanea* is present a 4 per cent boric acid solution or 2·4 per cent phenoxetol (*beta* phenoxyethyl alcohol) should be used locally, when the ulcer begins to granulate, saline dressings alternating with Pellidol ointment or allantoin powder will be found helpful

Care of the bowels

Severe constipation is usual, and digital removal of faeces may be necessary If abdominal distension is marked an oil or soap enema should be given The tubing should be inserted some distance up the large bowel to relieve flatus An aperient such as cascara sagrada may be necessary every other night followed by an enema in the morning

Care of the bladder

inevitable, but with efficient treatment the risk of a pyelonephritis is much reduced Skilled supervision of the bladder is all important both in the acute and chronic stages of paraplegia For this reason such cases should be admitted to a properly equipped hospital with the minimum of delay When doubt exists as to the severity of the cord lesion and therefore the probable duration of the retention, the effect of an intramuscular injection of 0 25 milligram of Carbachol (*B P*) should be tried No harm will result if the bladder is allowed to distend for 24–36 hours There is a choice of three methods when dealing with persistent retention of urine (a) intermittent catheterization, (b) a high suprapubic cystostomy; and (c) an in-

in the care of the paralysed bladder

Intermittent catheterization— This method will, sooner or later, inevitably lead to a urethritis, severe cystitis and a grave risk of pyelonephritis However its use is justified if the duration of retention is likely to be short, as in acute poliomyelitis or the less severe forms of acute myelitis A non-touch technique, such as that described below, should be used whenever a catheter is passed

(i) The medical attendant, wearing a mask, retracts the foreskin and wraps the

The

definite advantages at a later stage in treatment Except in fracture-dislocation, the patient should not remain recumbent any longer than is necessary, this is an important point both in the prevention of bedsores and of urinary calculi After a few days the diet should be full and the fluid intake liberal

Care of the skin —The anaesthetic skin of an acute spinal paraplegic patient is extraordinarily sensitive to minor trauma, due to the loss of tone in all soft tissues and a lowering of the tissue resistance to pressure Continued pressure on one area for a few hours, a wet bed or an unevenness of the sheet are the usual factors leading to a bedsore Frequent changes of position, thorough attention to the skin over bony prominences and a dry bed are the best safeguards against this serious complication

Change of position —Except in cases of fracture-dislocation, 4 positions are available (i) the supine, (ii) the prone, and (iii) two laterals All 4 should be used In the prone position the patient should lie on 6 pillows (placed transversely, 2 under the chest, 2 under the hips and 2 under the knees) with a small pillow for the head This arrangement will not interfere with a suprapubic tube For the first 2 or 3 weeks the patient should be turned every 2 hours, day and night, regardless of disturbed sleep At least 2 nurses should be available for this purpose The patient should be lifted not turned, since the friction in rolling may damage the skin Variations in pressure at different bony points can be made by the judicious use of small pillows Pressure on the heels can be prevented by placing 2 pillows under the calves, padded rings under the heels should not be used

Attention to the skin

The care of the skin is as much the responsibility of the doctor as of the nursing staff Every 4 hours a small amount of methylated spirit should be applied to the skin over pressure points, this should be followed by vigorous rubbing with the palm of the hand A dusting powder is then applied If the skin is hard and scaly, olive oil should be used in addition to spirit The use of soap and water should be limited to once or twice a day since more frequent application may lead to maceration of the skin Such treatment regularly carried out will improve the local circulation and so diminish the risk of a bedsore The bed must be kept dry, a wet draw sheet must be removed at once and care must be taken to keep the draw sheet even In hot weather sweating may be reduced by the use of a cage Attention should be paid to scaliness of the soles of the feet and toe-nails should be cut regularly

Treatment of bedsores

Three stages can be recognized in the formation of a bedsore (a) hyperaemia followed by oedema and induration of subcutaneous tissues, (b) necrosis of superficial layers of skin and formation of ulcer, and (c) extension of necrosis to deeper tissues, gangrene and sometimes sinus formation The following lines of treatment are those recommended by Guttmann (1948)

Superficial sores with excoriation of the skin —The skin should be cleansed with soap and water, sterile sulphonamide powder dressings or 2 per cent Pellidol ointment (diacetylaminoazotoluol and soft paraffin) and Tulle Gras or Allantoin Powder (*B P C*) should be applied If a blister has formed this should be removed before the application of the sulphonamide powder

needed for irrigation are ½ per cent acetic acid, boric acid, and flavazole 1 2 000, in cases with stone formation solution G may be used It must be emphasized that tidal drainage is not a method to be employed unless the medical and nursing staffs have been trained in its uses, furthermore it requires the intelligent co-operation of the patient If for any reason the apparatus ceases to work properly, the bladder will become distended In lesions above the mid thoracic region, distension of the bladder may cause certain symptoms of sympathetic origin namely headache with flushing of the head and neck The nursing staff should be instructed as to the significance of such symptoms which may also arise from a distended rectum (Guttmann and Whitteridge, 1947)

Sulphadiazine or Sulphamezathine 0 5 gramme 3 times daily should be given continuously as a routine in all cases of paralysed bladder Penicillin is also indicated in cases in which the predominant organism is penicillin sensitive Infection with *B proteus* is best treated with streptomycin

Psychological Aspect

A realization of their condition comes as a shock to patients suffering from a severe degree of acute paraplegia, readjustment comes slowly and painfully A cheerful attitude in the ward and contact with other patients and nurses does much to help these patients Diversional therapy should be started as soon as possible and reading should be encouraged

Any recovery of power within the first 3 or 4 weeks in a severe cord lesion or in poliomyelitis means that progress will continue and the patient should be informed accordingly During the early stage no promise of useful recovery should otherwise be made since a patient will suffer the keenest disappointment should this not come about When it becomes apparent that recovery will be slight in degree and long delayed, the patient should be reassured that, with rehabilitation and vocational training, a good prospect of a useful life lies in front of him

Treatment of the Paralysed Limbs

Correct posture and the use of passive movements must be attended to from the start The lower limbs should lie in an extended position and should be kept the

pillow can be placed Alternatively, as a temporary measure, sand bags may be used

Stage of Recovery

The objects of the treatment should be (i) to aid recovery in the paralysed limbs to the uttermost, (ii) to keep a vigilant eye on skin and bladder, and (iii) to exercise unaffected muscles so that they can compensate for any permanent loss of power in the lower limbs

Facilities required for a Spinal Centre are (i) sling apparatus of the Guthrie-Smith type, (ii) bed ring, pulleys and chains to be fitted to head of bed, (iii) parallel bars, (iv) wheel chairs, and (v) swimming pool

(iii) The penis is supported in an upright position by means of swabs so that the glans does not touch adjoining skin

(iv) The attendant now puts on sterile rubber gloves and covers the areas above and below the penis with a sterile towel

(v) If an assistant is available he now removes the sterile catheter from its sterile container with the forceps reserved for this purpose and hands it to the [illegible]

Suprapubic drainage—The old method of open cystostomy led to severe cystitis a contracted bladder and delay in the closure of the suprapubic opening The method of high suprapubic cystostomy introduced by Riches in 1943 is much to be preferred to the old operation It should be carried out within 36 hours of retention Previous urethral catheterization should be avoided A small catheter size 16 F is inserted into the distended bladder by means of a special introducer Its point of entry is opposite the highest point of bladder dullness or the midpoint between the umbilicus and the symphysis pubis whichever is the lower The catheter is changed after 14 days and thereafter at weekly intervals under strictly aseptic precautions [illegible]

only in lesion of the cauda equina but also in many cases of irrecoverable cord lesions The contra indications are a large amount of residual urine and an intractable cystitis The wearing of a urinal may be necessary After suprapubic drainage has ceased an occasional urethral catheterization should be carried out in order to determine the amount of residual urine and to combat any infection by means of wash outs In cases with a large amount of residual urine transurethral resection [illegible]

[illegible]

followed by insertion of an indwelling catheter and by tidal drainage Before inserting an indwelling catheter or changing it at the usual fortnightly intervals the urethra should be washed out with flavazole 1 2 000 The Foley self retaining catheter is advised a small size should be used When the automatic action of the bladder returns in from 1 to 3 months the indwelling catheter should be replaced by intermittent catheterization until detrusor action has sufficiently recovered and the amount of residual urine is small

Tidal drainage is a useful ancillary method in the control of cystitis and in the removal of small stones from the bladder The apparatus designed by Riches (1943) has a manometer attached and can be used for cystometrograms The fluids

Care of the skin and bladder

As the patient's general health improves, the skin becomes more resistant to pressure and, as a rule at the end of 3 or 4 weeks, it is possible to lengthen the interval of turning from 2 to 4 hours A careful watch must be kept on the drainage of the bladder and if infection develops appropriate wash-outs and medication should be administered.

Occupational therapy

As soon as a patient realizes that he may never be able to earn his livelihood in the way he did formerly, his morale is lowered unless measures are taken to maintain it A good occupational therapy department plays an important role in rehabilitation Mild diversional therapy should be started within 2 weeks of the onset if the general condition of the patient permits Later, a severe paraplegic whose upper limbs are intact, should be encouraged to choose some particular type of occupational work by means of which he might contribute to his livelihood after he leaves hospital this includes leather work, watch repairing, carpentry, toy-making, and similar occupations This goal acts as a useful incentive and helps to dispel the feeling of uselessness which many of these patients feel

The use of special appliances

In a severely paraplegic patient, walking will not be possible without the aid of calipers The purpose of the caliper is to keep the knees fixed in extension and the [illegible]

the thigh corset must not be too high lest pressure is brought to bear on the ischial tuberosity The thigh and calf corset should be fitted with leather bands rather than with laces in order to facilitate their use In low lesions of the cord, a corset should not be necessary if proper training of the abdominal and back muscles has taken place, thus enabling the patient to walk by pelvic tilting Instrumental aids to the trunk interfere with the use of these muscles, however, in women and older patients [illegible]

After-care and resettlement

Every case of paraplegia should be seen by the almoner before leaving hospital The milder type may be able to return to his former employment, this may apply even to a moderately severe case, if transport is available

In many cases registration under the Disabled [illegible] (Employment) Act, 1944, will be necessary

Guttmann, L (1946) *Brit J* [illegible] 9, 139
— (1948) "Bedsores" In [illegible] *Pract*[illegible] by E. Rock Carling and J Paterson Ross Lond[illegible]
— and Whitteridge D ([illegible]
Riches, E W (1943) *Lancet*, [illegible]
— (1943) *Brit* [illegible] 31

For individual cases the first two items are essential For the successful rehabilitation of the paraplegic the closest collaboration should exist between the physician, physiotherapist and nursing staff

Passive movements

These must be continued twice daily unless there is considerable return of voluntary movement As previously stated they prevent contractures and of equal importance they tend to diminish the tendency to flexor spasms

Active exercises

In the first few months attention should be equally divided between the lower

with if there is any voluntary return of power From the beginning special attention is paid to those muscles which compensate for any loss of action of the paralysed muscles This is of vital importance in rehabilitation of patients with severe lesions of the lower dorsal cord and cauda equina A strong action in the abdominal muscles erector spinae and latissimus dorsi will improve balance and mobility of the trunk and will make the use of the upper limbs more effective owing to the in-

Assisted movements of the lower limbs are carried out with the slings in the Guthrie Smith apparatus Exercises of normal muscles against resistance are done by means of pulleys and weights (Guttmann 1946)

The aim of both these sets of exercises should be explained to the patient as his active and intelligent co operation is essential to success The same principles apply in lesions of the cord at higher levels, but obviously they will have a more limited application For these patients balancing exercises in front of a mirror will help to restore balance and will enable them to sit in a wheel-chair without support of corset or appliances

Wheel chairs

Unless there is any reason to the contrary a patient with a severe lesion of the spinal cord should be sat in a chair at the end of a month for lengthening periods Promotion to a wheel-chair should take place soon after, and is important psychologically

Electrotherapy

This has no place in the treatment of the spastic type of spinal paraplegia On the other hand it is of considerable use in the treatment of lesions of the cervical

be progressively increased

Recognition of the early symptoms of infection with insistence on rest in bed

contact of young adults or children with a proven case should be avoided for 21 days In an infected area the re opening of schools for the winter term may have to be postponed, more especially if a virulent form of the disease is present A few cases of paralytic poliomyelitis in a boarding school should not, as a rule, result in its closure, since infection is probably widespread The routine of the school should proceed normally except that the school should be put in quarantine for three weeks from the date of the last suspected case A few simple facts about poliomyelitis virus infection should be given to both parents and pupils, stress being laid on the small risk of paralysis in those who become infected All members of the school, including the staff, should be warned to report sick with any minor ill ness, and rest in bed should be compulsory Anti fly measures on a reasonable scale are justifiable

Specific Treatment

Controlled experiments show that human convalescent serum is of no value in preventing the development of the disease or in limiting its spread Similarly, the *gamma* fraction has also proved to be useless Neither the experimental nor the human forms of the disease respond to sulphonamide therapy

General Management

isolated until the fever subsides A light diet should be allowed and fluids should be given freely Lumbar puncture should be carried out in cases showing meningeal symptoms or signs

Protection of Personnel

Masks should be worn by medical and nursing staff until 5 days after the patient's fever has subsided Gowns should be worn for 3 weeks Personnel should be warned of the importance of washing the hands in a disinfectant after handling the patient or the bed clothes All excreta must be carbolized No visitors should be allowed for the first week and the precautions mentioned above must be observed

TREATMENT OF PARALYSIS

There are three stages in the treatment of a case of poliomyelitis (1) the acute stage which lasts 3–4 weeks, (2) the early stage of recovery, a period varying from 1 to 6 months, and (3) the late stage of recovery, lasting from 6 months to 2 years

Principles of Treatment during Acute Stage

Opinion as to the best methods of treating infantile paralysis in the early stages has changed more than once during the past 20 years From a policy of complete in activity for several weeks, the pendulum has swung far in the other direction due

POLIOMYELITIS: ACUTE

HISTORY

occur from time to time, depending on climatic and other factors Thus, it may be *assumed that infantile paralysis will make increasing claims on medical resources* throughout Great Britain

AETIOLOGY

Acute poliomyelitis is caused by a small virus which possesses a high degree of neurotropism for anterior horn cells and for nuclei of motor cranial nerves,

disease

There is, as yet, no uniformity of opinion amongst epidemiologists as to the

incubation period varies from 3 to 21 days, with an average of 7–14 days

PREVENTIVE MEASURES

outlook may be mentioned

or without catarrhal or intestinal symptoms (abortive type) *In the minority of cases such symptoms are accompanied by signs of meningitis (non-paralytic type)*

(2) The disease is spread by healthy carriers and abortive cases, thus making many of the preventive measures ineffectual

(3) The likelihood that immunity in adult life can only be obtained by repeated subclinical infections in childhood (Burnett, 1946, Hammon, 1949)

of splints

The use of heat.—The application of heat, preferably in a moist form, is now accepted as a useful adjunct in the relief of pain and spasm If such treatment increases the pain or fatigues the patient, the method of application is faulty Heat in moist form is preferable to that induced by diathermy or a heated cage Moist heat is best applied by means of hot packs This method should not be undertaken unless the necessary personnel and equipment are at hand

The following articles are required a fish kettle, a hot plate, woollen material folded in triangles for neck, shoulder and hip packs (rectangular packs for all other areas), and jaconet to cover the packs

The patient should lie between blankets The packs are placed on the tray in the fish kettle above water level, they are boiled for 10 minutes, removed, and the steam shaken out The pack is then placed on the affected group of muscles and is covered with jaconet

Packs may be applied to the trunk and limbs but they should not be applied to the elbow, wrist, knee and ankle joints Packs should be applied for half to one hour, 3 or 4 times daily, each pack should be left *in situ* for not more than 10–15 minutes

Analgesics and sedatives.—Analgesics such as aspirin and Amidopyrine (*B.P*) or Veganin will be necessary during the stage of pain and spasm when these are marked features Physeptone, 5 milligrams, one tablet 3–4 times daily, may be given If the patient is anxious, phenobarbitone, ½ grain thrice daily is indicated, as well as a nightly sedative such as Syrupus Chloralis (*B P C*), 60–90 minims

Prevention of adhesions and contractures

Unless passive movements are carried out, more particularly at the proximal joints, adhesions may subsequently form which will retard progress to recovery Therefore, a full range of movement at each joint is necessary, once daily at first and, later, twice daily These movements should not be begun until 7–10 days after the fever has subsided If spasm is a marked feature, then hot packs should be applied before the limbs are moved

Charting of muscle power

During the first and second stages of treatment, periodic muscle charting should be done, using the scale advised by the Peripheral Nerve Injury Committee The scale is as follows

0 No contraction
1 Flicker or trace of contraction
2 Active movement with the force of gravity eliminated
3 Active movement against the force of gravity
4 Active movement against gravity and resistance
5 Normal power

A chart of this type enables the doctor and the physiotherapist to gauge the progress of the case During the acute stage charting should be limited to once a week

chiefly, to advocates of the Kenny treatment It is now realized that the best results are obtained from measures which lie between these two extremes The acute in

during this stage

Limitation of spread of paralysis

As soon as acute poliomyelitis is suspected the patient should be put to bed, the head should be supported by one pillow and fracture boards should be placed under the mattress Changes of position may be allowed in the early stages when restlessness is a feature but thereafter the importance of correct posture should be explained to the patient, more especially if the muscles of the back and abdomen are paresed Unnecessary examinations of the limbs should be avoided and nurses should be instructed to handle the limbs with care and, in general, to disturb the patient as little as possible

Relief of pain and spasm

Pain and spasm are frequent accompaniments of the active stage of the disease

Correct posture.—The importance of correct posture cannot be over emphasized,

cotton wool will achieve this object When the muscles acting on the shoulder and elbow are paresed, the arm should not be fully abducted, but should be kept in a

that is to say, at an angle of approximately 100 degrees at the elbow Paralysis of the muscles acting on the hip joint and on the knee joint is common, in such cases the thigh should be slightly flexed at the hip joint and it should lie in a neutral position between abduction and adduction with the knee slightly flexed and the thigh supported so as to prevent external rotation If there is weakness of the muscles acting on the ankle, the correct posture of the foot midway between extension and flexion should be maintained by a board placed between the end of the bed and the mattress, and by means of sand bags When the proximal muscles of the lower limbs are affected, paresis of the abdominal muscles and of the erector

rected Splints may be necessary in certain cases, for instance, in a patient with

of case The milder cases of bulbar paralysis recover spontaneously, but survival from the severer forms is usually dependent on efficient treatment A patient with respiratory failure of bulbar origin should not be nursed in a Drinker apparatus, since it is impossible to maintain a clear airway Artificial respiration can be carried on by orthodox methods or by rhythmical pressure on the sternum, as already described Mental confusion *indicates anoxia, this should be treated by oxygen* given through a B L B mask Collections of mucus in the throat should be removed by suction When the degree of respiratory paralysis is not severe, the patient should be nursed in a semi prone position with the head low and the foot of the bed elevated so as to promote drainage of mucus If these measures fail, tracheotomy should not be delayed A further indication for this operation is laryngeal stridor Nasal tube feeding will be necessary in the majority of cases A rising pulse rate indicates cardiac failure and treatment is useless in this type of case

EARLY STAGE OF RECOVERY

In mild cases of poliomyelitis, recovery may occur within a few days of the termina*tion of fever, but in the average case of moderate or severe paralysis, the stage of* recovery signifies not so much the first sign of return of power, as the point at which active treatment may commence If by the end of the third week all pain and tenderness have disappeared, then this active phase of treatment can be entered upon but if tenderness is still marked, it is better to defer the active treatment until the fourth or fifth week

Physiotherapy

Characteristic of the early stage of recovery is an incoordinated movement at the joint whose muscles are paresed This movement may be due either to pain resulting in a disturbance of reciprocal innervation or to lack of understanding on the part of the patient as to what is expected of him An essential step in the treatment is an explanation by the physician or physiotherapist of the normal action of the weak muscles so that the patient has a mental image of what he is trying to do

to progress quickly, must be resisted If spasm continues to be a feature, packing or a hot bath must be given before exercises

The elimination of gravity is an important aid in the treatment of the paralysed limb This can be achieved either by the use of slings or by means of a swimming pool

Sling exercises

The Guthrie Smith apparatus provides a convenient method of suspending the limb or trunk by means of slings (*see* Brain—Vascular Disorders, page 275) If this apparatus cannot be obtained, slings may be made from canvas and can be suspended from a Balkan beam By adjusting the point from which the sling is suspended, it is possible to grade exercises according to the amount of lateral resistance offered to any particular movement The effect on the patient's morale is considerable, since with a limb in slings he is capable of movements which would otherwise be impossible

A reading of 3 or better within the first month means a good recovery in that muscle, whereas a reading of 1 or 0 at the end of the same period indicates severe residual paralysis

TREATMENT OF COMPLICATIONS IN THE ACUTE STAGE

Respiratory paralysis

A careful watch for early signs of respiratory paralysis is necessary, particularly in the "ascending type" of acute poliomyelitis When movement of one or both sides of the chest becomes restricted or when there is difficulty in taking a long breath, arrangements should be made to nurse the case in a Drinker apparatus, by transfer, if necessary, to another hospital It is the responsibility of a hospital holding one of these instruments to ensure first, that it is properly maintained, and secondly, that a small team of doctors and nurses is trained in its use. The necessity for this form of treatment should be explained to the patient and he should be told that he must let the machine do the breathing for him Phenobarbitone, 1 grain, should be given to allay anxiety, and it should be maintained in ½-grain doses, thrice daily A well-fitting neck-piece makes a great deal of difference to the patient's comfort A pressure of −10 to −15 millilitres of water should be maintained The rate of breathing can be regulated; 18 per minute is an average rate Adequate nourishment and fluids should be given The patient should be taken out of the apparatus every four hours for attention to bladder, bowels and skin Good team-work is essential, as when paralysis is complete, or nearly so, the patient should not

fingers It may be necessary to administer oxygen through a B L B mask After the

out of the Drinker apparatus, may help to prevent this complication Should it arise, bronchoscopy should be carried out as an emergency Emphysema is another complication of "iron lung" treatment, it may be avoided by limiting the degree of respiratory excursion

Retention of urine

This is a common complication in cases of severe paraplegia. Carbachol (*B P*)

with by an enema

Bulbar paralysis

POLYNEURITIS

This symmetrical paresis of all four limbs, with or without sensory loss, may occur acutely or may be slowly progressive.

AETIOLOGY

Many causes of polyneuritis are now recognized, broadly speaking, they fall under one of the following headings (1) an infective condition, for example, acute toxic polyneuritis of virus origin, diphtheritic polyneuritis, (2) deficiency and metabolic disorders, for example, nutritional polyneuritis, pernicious anaemia, diabetes mellitus, (3) extrinsic poisons, (4) other causes

Careful history-taking may suffice for an accurate diagnosis When the aetiology is in doubt the cerebrospinal fluid should always be examined A normal fluid is found in polyneuritis due to extrinsic poisons and avitaminosis A moderate rise in the protein content of the fluid may occur in the diphtheritic and diabetic forms, while a marked increase is usual in acute toxic polyneuritis and in that form of polyneuritis which may occasionally complicate carcinoma A blood count and fractional test meal will be necessary when the early stage of subacute combined degeneration of the cord is suspected

TREATMENT

This should be first directed to the underlying cause, in practice this is only possible in the case of extrinsic poisons, malnutrition and metabolic diseases complicated by polyneuritis Secondly attention is given to the treatment of the paralysis

Extrinsic Poisons

In acute lead poisoning treatment should be directed towards the immobilization, in the bones, of the lead phosphate circulating in the blood (*see* Lead Poisoning, [illegible] 3 or 4 times [illegible] may be [illegible] litres of [illegible] y hyper [illegible] ounces of 25 per cent solution magnesium sulphate per rectum) In the chronic stage of lead poisoning, lead should be eliminated from the body The calcium content of the diet should be low Ammonium chloride should be given in doses of 6–8 grammes daily in water, this will promote acidosis and the elimination of the lead During this treatment a careful watch should be kept for signs of lead encephalopathy

Arsenical Intoxication

[illegible] (BAL) [illegible] of value, 2 millilitres [illegible] 3 days twice [illegible] millilitres of distilled water should be given intravenously

Use of swimming pool

As an alternative to sling exercises, a swimming pool, when ava

Compensatory exercises

By the end of the second month, the margin of further improve occur in a severely paralysed muscle is very small, and therefore at be directed towards compensatory exercises of unaffected musc facilitate the movement of the paralysed part These exercises are m and they form an essential part of the treatment of a severe case o (*see* Paraplegia, page 330)

Maintenance of morale

The mental outlook of the patient suffering from acute polio through a number of phases Initially, the possible consequences of not fully realized Between the second and fourth week a truer per situation is borne in upon the patient, and with it follows depressio During the next few weeks or months the patient slowly and pain adapt himself to the altered circumstances of his life and to all th Each of these phases is influenced by the patient's previous tempe the attitude of doctor, physiotherapist and nurse, who are capabl the patient's outlook on his illness in such a way that the phase of

with other patients in the ward, will all contribute to the maintenanc

Late Stage of Recovery

The late stage of recovery begins at the end of approximately 6 may continue for 2 years Increasing attention should be paid to com cises If the case is not already under the care of an orthopaedic surge should be sought. Calipers will be necessary in order that the pati paraplegia may walk In addition, a wheel-chair or an electrically should be provided The choice of work will depend on the nature residual disability (for further details, *see* Paraplegia, page 332)

Burnett F M (1946) *Virus as Organism* Cambridge Mass, Harvard U
Casey A E Fishbein, W I, Abram, I, and Bundisen H N (1946) *Am* 72 635
Hammon, W McD (1949) *Bact Rev*, 13, 135
Howe H A (1949) *Amer J Med* 6 537

neutral position If tenderness is a marked feature, the limbs should be wrapped in cotton-wool A full range of passive movements should be carried out daily Active movements should begin as soon as the acute stage of the condition is over Sling exercises by means of the Guthrie-Smith apparatus are of great value, faradic or galvanic stimulation is also indicated Occupational therapy or diversional therapy should be started as soon as sufficient recovery has taken place in the hands It is

ting factor, the patient should not remain in bed for longer than is necessary Residual weakness of the dorsiflexors of the foot may require a temporary or permanent toe-spring Acute toxic polyneuritis may be complicated by respiratory failure owing to paresis of the intercostal muscles and of the diaphragm, and artificial respiration will be necessary (*see* Acute Poliomyelitis, page 337) In this form of polyneuritis, provided the patient survives, recovery is much more complete than in a correspondingly severe case of poliomyelitis

TREATMENT OF MENTAL CONFUSION ASSOCIATED WITH POLYNEURITIS

This condition must be promptly treated by adequate nourishment If sufficient quantities of food cannot be given by mouth, then a nasal tube should be passed

minims thrice daily, will be necessary Constipation should be treated by enema rather than by purgatives Skilled nursing, with special emphasis on the care of the skin, is of the greatest importance

SPINAL CORD—SUBACUTE COMBINED DEGENERATION

Subacute combined degeneration of the spinal cord is a deficiency disease of the nervous system associated with pernicious anaemia and characterized at an early stage by peripheral neuritis with subsequent involvement of the posterior columns, pyramidal tracts and cerebral cortex

COURSE

Successful treatment depends on early diagnosis As a rule a stage of peripheral neuritis precedes the signs of spinal cord involvement Persistent paraesthesiae in hands or feet in a patient over the age of 30 years should suggest the diagnosis, and the necessary examination of blood and stomach contents should be made If the stage of spastic paraplegia is reached, only slight improvement can be expected from treatment, however energetic If on the other hand the case is treated early, all signs may disappear

TREATMENT

The general aim of treatment is to restore, as far as is possible, the normal function of the peripheral nerves and spinal cord by adequate doses of liver extract In acute

MALNUTRITION

Under this heading are included beri beri, pellagra and alcoholic polyneuritis Malnutrition is an unusual cause of polyneuritis in civilized countries during normal times of peace On the other hand, amongst prisoners of war and in a populace

(Wernicke s encephalopathy), cerebral cortex (mental confusion), optic nerves

per se is of less importance than the factors previously mentioned

Treatment

This should be directed towards a progressive building up of an ample high-calorie diet rich in vitamins, in a form which can be easily assimilated When gastro-enteritis is severe, milk and eggs in liberal quantities should form the basis of the diet, later, fresh meat, liver and kidney should be added Fresh brewer's yeast is of value in doses of 4–6 ounces daily In severe cases of polyneuritis, particularly when cardiac symptoms are present or when mid brain signs appear (Wernicke's

mouth in doses of 10 milligrams twice daily The effect of vitamin B_1 on nutritional polyneuritis varies according to the state at which treatment is begun In chronic or

250–500 milligrams daily

FORMS OF POLYNEURITIS OTHER THAN NUTRITIONAL

In the absence of a history of malnutrition, there is no justification for the intensive treatment of polyneuritis by vitamin B_1 A liberal diet with a high protein

underlying condition is all important, an extra supply of vitamin B_1 orally in the form of tablets or of fresh yeast should be given

THE TREATMENT OF THE PARALYSIS

SYPHILIS OF THE NERVOUS SYSTEM

(*see also* Venereal Disease)

GENERAL CONSIDERATIONS

The modern treatment of ne

914 (Neosalvarsan) was introduced In more recent years a series of pentavalent

course of the meningo-vascular forms of neurosyphilis, their effect on tabes dorsalis was limited, and on general paralysis of the insane it was negligible The latter fact led Wagner Jauregg in 1917 to treat 9 cases of general paralysis of the insane with tertian malaria, with satisfactory results Lastly, the unexpected response of primary syphilis to penicillin (1943) has led to

During the secondar

system, as shown by a

With adequate treatment the fluid returns to normal except in a small percentage of cases From this small group and from those cases in which the primary infection is untreated, are derived the neurosyphilitic patients

PROPHYLAXIS

An appreciation of the fact that a negative Wassermann reaction in the blood does not necessarily indicate a cure in a treated case of syphilis is of paramount importance A case of syphilis should not be regarded as cured unless the cerebro spinal fluid is normal in all respects at the end of 2 years after infection This fact must be impressed upon the patient If, at the end of this period the fluid remains abnormal, and if treatment has been adequate, then a course of penicillin followed by fever therapy, should be given In this way the fluid usually returns to normal and the risk of neurosyphilis is considerably lessened, if not abolished

TYPES OF NEUROSYPHILIS

Clinically, syphilis of the nervous system is divided into two types, meningo-vascular and parenchymatous This distinction is somewhat artificial, since all forms of neurosyphilis originally date from a blood stream infection, resulting in a meningeal reaction and a sensitization of the nervous system Since the symptomatology of each form is sufficiently distinct, and since the response of each to treatment differs, this terminology serves a useful purpose

SYMPTOMATOLOGY

diseases of

f this fact

cerebro

spinal fluid in any adult patient whose symptoms are not satisfactorily explained on the basis of a neurosis, or in whom the cause of certain abnormal signs in the nervous system is not clear Similarly, in the course of a general overhaul, either for insurance purposes or for some general medical condition, a simple examination of

cases the patient should be kept at rest in bed for 3 or more weeks. Attention to general health is important, obvious foci of infection should be eliminated.

LIVER

Large doses of liver must be given, the cruder preparations should be used, for example Livadex, Hepastab, Plexan, or Hepatex-T In an untreated case the daily intramuscular dose is 4 millilitres, this should be maintained for several weeks or months, depending on the response to treatment and the severity of the symptoms In addition an oral preparation, for example, liquid liver extract, in doses of 1 ounce daily, is indicated in severe cases or in those patients who refuse injections If there is an associated iron deficiency anaemia some form of easily digested iron should be prescribed.

[illegible]

return a heavier dose of liver is indicated If the response to the initial treatment has [illegible]

THE USE OF VITAMIN B_{12}

Preliminary reports suggest that vitamin B_{12} may prove as effective as liver in the treatment both of subacute combined degeneration of the cord and of pernicious anaemia Vitamin B_{12} is obtained from liver extracts and streptomycin wastes It has been isolated in pure crystalline form It is a large molecule, and its composition is known but not its structural formula One molecule of B_{12} contains one atom of cobalt. The effect of this preparation on the early stages of subacute combined degeneration of the cord may be dramatic Improvement is noted after 3 or 4 doses The dose recommended varies from a single intramuscular injection of 100 micro- [illegible]

for the first 6 months and half this dose for maintenance afterwards The dose is increased if there is the least sign of a relapse Anacobin, a solution of pure crystalline B_{12}, is supplied in 1-millilitre ampoules each containing 10 micrograms of B_{12}

PHYSIOTHERAPY

If there is postural loss with resulting ataxia, re-educational exercises are of the greatest importance At first these should be carried out in bed, for details *see* Paraplegia, page 330

Spies, T D, Stone, R E, Kartus, S, and Arumburu, T (1948) *Sth med J, Nashville*, **41**, 1030.
— Lopez, T R, Aramburu, T, and Kartus S (1949a) *J Amer med Ass*, **139**, 521
— Stone, R E, Lopez, G G, Milanes, F, Lopez, T R, and Aramburu, T (1949b) *Lancet*, **2**, 454
Ungley, C C (1949) *Brain*, **72**, 382.

TREATMENT

As a rule, the cell count and protein content of the cerebrospinal fluid rapidly diminish and become normal in a few weeks The Lange colloidal gold curve and Wassermann reaction respond less quickly, particularly when the results have been previously strongly positive If at the end of 6 months the fluid is still abnormal in these two respects, fever therapy is indicated, because there is every likelihood of a mixed type of neurosyphilis being present Whether penicillin alone is adequate in the treatment of meningo-vascular syphilis is a matter still unsettled For the present it would seem a wise precaution to give, in addition, courses of bismuth and of arsenic.

Penicillin

A course of 5,000,000–6,000,000 international units of penicillin is adequate in most cases It may be administered intramuscularly in the form of an aqueous solution made up by diluting the contents of a vial of Penicillin (Sodium Salt) (*B P*) or Penicillin (Calcium Salt) (*B P.*) containing 200,000 units in sterile water, or as procaine penicillin suspended in sterile arachis oil containing 2 per cent of aluminium stearate, each millilitre containing 300,000 units of penicillin and the equivalent of 120 milligrams of procaine base A number of leading pharmaceutical firms market both these preparations When using the aqueous solution the optimal dose for an adult is 200,000 units 8-hourly, in children correspondingly smaller doses should be given This is the preparation of choice for patients in hospital Procaine penicillin is more slowly absorbed and therefore need only be given twice in every 24 hours, in a dose of 300,000 units However, the higher cost as compared with the aqueous solution is a disadvantage In acute cases, whether cerebral or vascular, it is advisable to give small doses, that is, 15,000 units 3 times daily for the first 24 hours, in order to avoid a Herxheimer's reaction

Bismuth for intramuscular injection

Recommended injections are Injectio Bismuthi (*B P*), Bismostab (Boots Pure ... metallic bismuth in 1 ... 2 gramme and Stabismol ... 0 1 gramme bismuth per millilitre

A course consists of an initial injection of 0 1 *gramme* followed at weekly intervals by 11 injections of 0 2 gramme

Arsenical preparations

Preparations for intravenous injection include neoarsphenamine, and Novar- ... be ... 0 6 ... of 1 injection of 0 02 gramme followed by 1 injection of 0 04 gramme and 10 injections of 0 06 gramme

For intramuscular injection sulpharsphenamine, in an initial dose of 0 1 gramme and a maximal dose of 0 6 gramme is recommended Twelve injections should be

the nervous system should never be neglected, since neurosyphilis may for a time remain asymptomatic

The Results of Treatment

It has been generally accepted that the earlier a case of neurosyphilis is treated, the better are the prospects of a cure It is not difficult to understand why long-

was begun

Preliminary Investigations

followed by screening and electrocardiography The presence or absence of an enlarged liver and of albuminuria should be noted

In every case a blood Wassermann reaction must be carried out, and the cerebrospinal fluid must be examined (cell count, protein content, Lange colloidal gold curve and Wassermann reaction)

MENINGO VASCULAR SYPHILIS

Definitions

Under the heading of meningo-vascular syphilis are included the following conditions

Acute syphilitic meningo-encephalitis, a rare condition appearing usually within 2 years of infection

Neuro-relapse, characterized by the onset of ocular palsies, hemiplegia or other pareses during or immediately after inadequate treatment of secondary syphilis

Syphilitic meningitis, either vertical or basal, which may cause a variety of symptoms including headache, epilepsy (focal or generalized), optic atrophy, ocular and other cranial nerve palsies and a hypothalamic syndrome

Syphilitic endarteritis resulting in hemiplegia, monoplegia or other focal signs

signs

Syphilitic myelitis, either acute, resulting in a myelitis of rapid onset from thrombosis of a spinal artery, or chronic, in which form a slowly progressive paraplegia occurs

Syphilitic amyotrophy, a comparatively rare condition characterized by pain and muscular atrophy, usually in the upper limbs, with or without a spastic paraplegia.

(c) A course of intravenous arsenic, 12 injections at weekly intervals (these may be given at the same time as the bismuth injections)

(d) A further 2 courses yearly of bismuth and arsenic during the first 2 years of treatment

(e) Further courses during the third and fourth years as indicated by the clinical course of the disease, and by the cerebrospinal fluid findings

	Total Dosage		
	Penicillin (units)	Bismuth (grammes)	Arsenic (grammes)
First year	5,000,000–6,000,000	4·6	13·5
Second year	—	4·6	13·5
Third and Fourth years,	—	2·3–4·6	6·75–13·5

Irrespective of whether mental changes are present or not, a case of tabes show-

[illegible]

Tabetic pains.—For tabetic pains intensive treatment on the lines already indicated should be given. If these fail, fever therapy may be tried. Analgesics will be necessary, morphine should not be given. Physeptone, 5–10 milligrams, affords relief when the pain is severe.

Ataxia.—Much can be done for ataxic patients by means of physiotherapy and re-educational exercises, particularly of the Fraenkel type. These are a carefully graded series of movements and exercises used in the re-education of the ataxic patient.

The tabetic bladder.—Precipitancy of micturition may be troublesome in the early

[illegible]

patients, particularly if at any time catheterization has been necessary for retention of urine. Finally, the stage of dribbling incontinence may be reached. The treatment of the tabetic bladder comes within the province of the urologist and should be treated by him rather than by the general practitioner in the first instance.

Gastric crises.—Light meals, avoidance of fatigue and emotional stress and [illegible] gastric crises. An [illegible] ...enobarbitone, [illegible] aborted by an [illegible] ...ligrams by injection, is preferable to morphine in a severe attack.

given at weekly intervals, of which the last 10 should be of the strength of 0 6 gramme

The course of arsenic should commence as soon as penicillin treatment is finished, thus the courses of arsenic and bismuth will overlap and the total duration of this phase of treatment will be 14 weeks

Duration of treatment

As has already been indicated, no form of treatment will restore nervous tissue that has been severely damaged The necessity for further treatment will depend on the nature and extent of the underlying pathological lesion, on its response to previous treatment and on the degree to which normality of the cerebrospinal fluid has been achieved The Wassermann reaction alone should not be used as a guide, as it may not show much alteration under 1 or 2 years If a patient has shown a partial but inadequate response to treatment, a further course of penicillin, bismuth and arsenic should be given after 3 months' rest At the end of a further 3 months the cerebrospinal fluid should be re-examined and further treatment should

[illegible]

cally and serologically, the patient should be informed that a further examination of the cerebrospinal fluid will be necessary in 6 months' time, and that the question

[illegible]

6 months later.

SEQUELAE OF MENINGO-VASCULAR SYPHILIS

Treatment of the sequelae of meningo-vascular syphilis is fully discussed under Brain—Vascular Disorders (*see* page 271) and under Paraplegia (*see* page 325)

PARENCHYMATOUS FORMS OF SYPHILIS

Under the heading of parenchymatous forms of syphilis are included general paralysis of the insane and tabes dorsalis

GENERAL PARALYSIS OF THE INSANE

The importance of early diagnosis and treatment has already been stressed. Modern methods of treatment, if instituted early, will result in improvement on the usual figures given in respect of the results of malarial treatment, that is, 25 per cent cure and 25 per cent improvement

[illegible]

Aetiology

may effect the vestibular nuclei or their connexions are vascular and neopl
lesions, disseminated sclerosis and a syphilitic meningitis The vestibular n

caused by altered intracranial pressure for any reason, namely cerebral tumou
abscess, meningitis, or following brain trauma. Giddiness may be a symptom o
anxiety state, and it is a common symptom of arterial hypertension.

AURAL VERTIGO

Neighbourhood disorders

The great majority of cases of true vertigo are of aural origin Deafness
tinnitus are commonly associated symptoms. Wax which blocks the exter
auditory meatus may cause vertigo. The removal of wax, which is also necessary
the examination of the tympanic membrane, is, therefore, the first step in treatme
Similarly, blocking of the Eustachian tube, which may also lead to unequal int
aural pressure, may cause vertigo. This may be due to acute or chronic postna
nasal passages, b
that dental sepsi
tiological connex
with catarrh of the upper respiratory tract, especially catarrh of the parana
sinuses Vertigo caused by these factors may be due to alterations in the press
of the endolymph system.

Treatment

through the nasal passag
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tion may l

Surgical treatment may be indicated for the removal of adenoids for enucleatio
of chronically infected tonsils, for turbinectomy or sub-mucous resection to im
prove the airway through the nasal passages, and for sinusitis.

LABYRINTHINE VERTIGO

Acute catarrhal and suppurative labyrinthitis is due to a bacterial infection Th
response to penicillin and to the sulphonamide drugs is usually good

Various surgical measures, including bilateral resection of lower dorsal roots, have been tried, but none is reliable

Trophic lesions—The classical perforating ulcer can be prevented by properly fitted shoes or boots, and by periodic visits to a chiropodist If an ulcer forms, the treatment is that of any deep-seated ulcer

A Charcot's joint arises as a result of trauma The early stage of synovial effusion should be treated by complete rest and immobilization of the affected limb until all signs of swelling have disappeared A Scott's dressing is sometimes of value In the case of a knee or ankle joint, an elastic bandage may limit the range of movement In chronic or progressive cases of arthropathy, instrumental or orthopaedic measures should be taken to immobilize the affected joint

DOUGLAS McALPINE

VERTIGO AND GIDDINESS

INTRODUCTION

The term vertigo should be limited to a sensation of rotation or other movement of the body in relation to its surround or of the movement of external objects in

lesion or disseminated sclerosis In the severest cases of paroxysmal aural vertigo the onset may be so sudden as to throw the patient to the ground, it may even be

NEUROLOGICAL CAUSES

Physiopathology of vertigo

impulses is brought about through the agency of the cerebellum, the vestibular nuclei, the posterior longitudinal bundle which connects the eye muscles with the vestibular nuclei, and by ascending pathways from the red nucleus which travel upwards to the parietal and temporal cortex Vertigo may be caused by a disorder

and Theobromine (*B P C*) one tablet twice daily (each tablet contains phenobarbitone ½ grain and theobromine 5 grains) Phenobarbitone, ¼–½ grain given 2 or 3 times daily, may be equally effective *On the basis of the hypothesis that* water retention may be an aetiological factor, a severely restricted sodium salt intake is prescribed together with ammonium chloride, 15 grains given by mouth 3 times daily (Ammonium Chloride "Emplets" 7½ grains in each)

Surgical treatment

Severe recurrent aural vertigo which does not respond to medical treatment may be cured by surgery, namely labyrinthectomy, or intracranial division of the vestibular branch of the eighth nerve The drawback to the first operation is that it leaves the patient completely deaf in the operated ear, and, as Ménière's disease usually spreads to the other ear, total deafness might result. This operation is also indicated in severe cases of aural vertigo which are for any reason unsuited for an intracranial operation In the hands of an experienced neurosurgeon, intracranial section of the vestibular portion of the eighth nerve has a negligible mortality It [illegible]

[illegible]

constrictor fibres controlling the blood supply to the internal ear Garnett Passe is [illegible] s vasoconstriction, and in [illegible] 1 and Th 2, excises the [illegible] ld seem that sympathetic [illegible] lls of the vertebral artery [illegible]

artery and in some cases by dividing this artery

TREATMENT OF GIDDINESS

This essentially consists in the treatment of the underlying cause, whether this is [illegible] n most cases [illegible] (each [illegible]) milligrams of phenobarbitone), the dose is one tablet 3 times daily after food Some cases respond to quinine sulphate, ½–1 grain given 3 times daily

In all cases of vertigo and giddiness all general measures for improving the patient's health and strength should be adopted *The recovery of exhausted physical* and nervous reserves is particularly important

DOUGLAS McALPINE
GEOFFREY EVANS

Brain, W Russell (1947) *Diseases of the Nervous System* London Oxford University Press

Passe, E Garnett, and Seymour, J S (1948) 'Ménière's Syndrome' *Brit med J*, 2, 812

Chronic labyrinthitis is often a compl cation of chronic suppurative otitis media for which *surgical treatment* is generally indicated Other recognized causes of

giddiness Giddiness may also be a symptom of poisoning by lead mercury, arsenic the barbiturates and streptomycin

Treatment

The treatment of the above conditions is on an aetiological basis

RECURRENT AURAL VERTIGO (MÉNIÈRE S DISEASE)

heading of labyrinthine vertigo (Brain 1947)

Physiopathology

As a working hypothesis alteration of the pressure of the endo perilymphatic system or anoxia due to circulatory disturbance may explain vertigo in those cases in which definite pathological changes such as inflammation degeneration and haemorrhage are not demonstrable The evidence for the explanation of vertigo in terms of circulatory disturbance is (a) the association of vertigo with hypertension and its occasional relief by the administration of potassium thiocyanate (b) the

Another hypothesis to account for vertigo is a d sturbance of sodium metabolism in the local tissues leading to water retention

Treatment by drugs

When seized with an attack the patient must perforce lie flat and any movement of the head should as far as possible be avoided In a severe attack sodium pheno barbitone 3 grains (0 2 gramme) is given by subcutaneous injection or Pernocton (butyl β bromallyl barbituric acid 1 millil tre contains 1½ grains (0 1 gramme) *time taken for intravenous injection of 1 millilitre is one minute) 1 millilitre in* travenously will afford relief If the pat ent is not vomiting Sodium Amytal 3 grains given by mouth repeated in 3 hours if the attack persists has a slower but equally good effect To prevent attacks the administration of a barbiturate is generally the most effective treatment phenobarbitone ½–1 grain (30–60 milli grams) is given every night at bedtime an alternative is Tablets of Phenobarbitone

irritant Thus if you are sensitive to dust and feathers and sleep on a feather pillow or on a feather bed and lie quietly on it, the brick will be much smaller than if you are restless and thus breathe in more feather dust or bedding dust generally These two, household, textile or bedding dust and feather dust, are probably the most common irritants we meet with in asthma Now you will probably ask, "Why is it that I can sleep

dust but that it needs some other factor or factors to make more bricks to reach your threshold Such other factors may be contact on the occasion of the attack with other substances to which you may be sensitive, for instance cheese or other foods, or horse hair, but it is more likely due to bricks caused by what may be termed non specific or intrinsic factors One of the most important of these is the psychological or nervous factor Any emotional upset, worry, excitement, overtiredness and so on may act as a brick and bring the total level up to the threshold Another common non specific

tree and act as a brick so that meals at night must always be light and taken several hours before going to bed All rich drinks such as cocoa, malted milk, egg and milk drinks should be forbidden at night

This explanation is usually carried out while skin testing is proceeding, and is expanded to cover any sensitivities known to the patient or which are revealed by

It is therefore imperative that all the extrinsic factors to which the pat

those substances to which the patient is sensitive can be reduced, then the patient can stand more of the intrinsic factors, which usually cannot be avoided, without the pile of bricks reaching the threshold If the bedroom is freed as much as can be from the extrinsic irritants, then contacts elsewhere, for instance feather cushions in the lounge, can be neglected in most cases Common sense must be used, nothing could be worse than to convert a patient into a fussy introspective person who flies if he sees a feather cushion or a cat in a friend s house

On general principles, the bedroom should be airy and as free from dust-producing furniture as possible The more it resembles a hospital ward the better It should

most important source of dust is the bed itself, this must be cleared of all feathers or dusty bedding The best mattress is a Dunlopillo rubber mattress and the best pillow is the Dunlopillo rubber pillow, as the latter is expensive, a kapok or flock

CHEST DISEASES

ASTHMA—BRONCHIAL

Bronchial asthma may be defined as a paroxysmal type of dyspnoea due to obstruction of the smaller bronchioles by spasm of the bronchial muscle, swelling of the bronchial mucous membrane or formation of an obstructing secretion It is associated with marked prolongation of the expiratory phase of respiration

Treatment aims at relieving such spasm or swelling and the prevention of any recurrence

Cases of asthma are often divided into extrinsic and intrinsic types The extrinsic type is considered to be caused by irritation due to the inhalation, ingestion or other contact with certain substances such as dust, feathers and foods, to which the person is sensitive, in intrinsic asthma on the other hand, the stimulating or irritating factors come from within, for instance psychological stress and bacterial infection In the bulk of cases, however, both intrinsic and extrinsic factors are at work It is the author's belief that full benefit to the patient can be obtained only if this question of intrinsic and extrinsic factors is fully explained to the patient so that he understands the often multiple factors in the causation of any attack This explanation is fully as much a part of treatment as is the prescription of antispasmodic drugs or of a course of desensitizing injections Without it the patient will not understand the necessity for the measures to be outlined and will not co-operate

ures

(2) Method of desensitization
(3) Treatment of the acute attack
(4) Treatment of status asthmaticus
(5) Other measures

EXPLANATION OF THE CONDITION TO THE PATIENT AND GENERAL PROPHYLAXIS

The actual mechanism of the bronchial obstruction as described in the definition given above is explained and then the multiplicity of factors responsible for the obstruction are discussed with the patient in simple language as follows

begins The size of each brick depends on the amount of contact with the particular

irritant Thus if you are sensitive to dust and feathers and sleep on a feather pillow o on a feather bed and lie quietly on it, the brick will be much smaller than if you ar restless and thus breathe in more feather dust or bedding dust generally These two household, textile or bedding dust and feather dust, are probably the most commo irritants we meet with in asthma Now you will probably ask, "Why is it that I can slee [illegible]

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pressure—all these may act as bricks, again, a respiratory infection such as a cold o bronchitis causes a direct irritation of the respiratory tract by the bacterial action an will act as a brick Finally, anything that will cause indigestion, any overloading of th stomach with rich food, especially at night, will tend to cause a reflex to the bronchi tree and act as a brick so that meals at night must always be light and taken severa hours before going to bed All rich drinks such as cocoa, malted milk, egg and mill drinks should be forbidden at night

This explanation is usually carried out while skin testing is proceeding, and i expanded to cover any sensitivities known to the patient or which are revealed b the skin tests as the explanation proceeds It is then pointed out that little can b done in respect of the psychological and climatic factors and the common cold It is therefore imperative that all the extrinsic factors to which the patient may b sensitive should be avoided Elimination must be as complete as possible in th bedroom First, because the patient spends approximately one-third of his life i the room, secondly because he has his most intimate contact with bedding dust an feather dust, the two most important external irritants, in his bedroom, and thirdl because this is the room where symptoms are most likely to occur If contact wit those substances to which the patient is sensitive can be reduced, then the patien can stand more of the intrinsic factors, which usually cannot be avoided, withou the pile of bricks reaching the threshold If the bedroom is freed as much as can b from the extrinsic irritants, then contacts elsewhere, for instance feather cushion in the lounge, can be neglected in most cases Common sense must be used nothing could be worse than to convert a patient into a fussy introspective perso who flies if he sees a feather cushion or a cat in a friend's house

On general principles, the bedroom should be airy and as free from dust produc ing furniture as possible The more it resembles a hospital ward the better It shoul be cleared of pictures, bookcases, bric-à brac, toy boxes and anything which ma hold or cause dust The floor should be of stained boards or be covered by linoleum with one or two washable mats which should be washed at least twice a year The most important source of dust is the bed itself, this must be cleared of all feathers o dusty bedding The best mattress is a Dunlopillo rubber mattress and the best pillow is the Dunlopillo rubber pillow, as the latter is expensive, a kapok or flock

pillow covered over the ticking with some such airtight covering as jaconet or plastic is useful when several pillows are needed It must be remembered that all feathers must be removed from the bedroom in feather sensitive cases Not infrequently it is found that the wife has retained her feather pillow while the affected husband has a rubber one This inability of many patients for logical thought, emphasizes the need for a detailed discussion of methods of clearing the bedroom of dangerous allergens

The subject of the clearance of the bedroom from dust and feathers has been discussed at length because these are the most common allergens Any other allergens as shown by the skin tests should likewise be excluded as much as possible from the environment and any foods to which the patient is sensitive must be avoided

As it is impossible to avoid wholly such things as house dust, desensitization is usually necessary and will be described below The author usually prescribes an antispasmodic medicine to be used prophylactically under conditions which make an attack likely The formula recommended is the following which is marketed under the name of Linctus Anti Asthmatic The dose is ½–2 teaspoonfuls at bedtime according to age

Pseudo-ephedrine hydrochloride	1 gr	60 mg
Tincture of Stramonium (*B P*)	15 min	1 ml
Syrup of wild cherry	60 min	4 ml
Syrup of Codeine Phosphate (*B P C*)	60 min	4 ml

This mixture is given last thing at night whenever the patient has been upset or over-excited

respiratory

has passed

prophylactic use of antispasmodics and with desensitization, almost all cases in which extrinsic allergens are an important factor can be kept symptom free

SPECIFIC DESENSITIZATION OR HYPOSENSITIZATION

discussed under Urticaria and Angioneurotic Oedema (page 14)

Since the commonest inhalant causes of asthma are dust, feathers animal hairs and orris root desensitization using a mixture of these will have beneficial results

preparation of such specific solutions or vaccines and the author has found some of these preparations very satisfactory The strength of the desensitizing solution and the length of the course of treatment depends to some extent on the degree of

irritant Thus if you are *sensitive to dust and feathers* and sleep on a feather pillow or on a feather bed and lie quietly on it, the brick will be much smaller than if you are restless and thus breathe in more feather dust or bedding dust generally These two household, textile or bedding dust and feather dust, are probably the most common irritants we meet with in asthma Now you will probably ask, ' Why is it that I can sleep

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Syrup of wild cherry	60 min	4 ml
Syrup of Codeine Phosphate (B P C)	60 min	4 ml

This mixture is given last thing at night whenever the patient has been upset or over-excited, or has had a very tiring day Again, if the patient has any sign of respiratory infection, the medicine should be taken each night until the infection has passed With clearance of the environment of the offending allergens, with prophylactic use of antispasmodics and with desensitization, almost all cases in which extrinsic allergens are an important factor can be kept symptom free

SPECIFIC DESENSITIZATION OR HYPOSENSITIZATION

Hyposensitization is probably the better term because, except perhaps in pollinosis, complete desensitization is extremely rare However, clinical desensitization is often relatively easily obtained The subject of non specific desensitization is discussed under Urticaria and Angioneurotic Oedema (page 14)

Since the commonest inhalant causes of asthma are dust, feathers, animal hairs and orris root, desensitization using a mixture of these will have beneficial results in most cases Such a solution is marketed under the trade name of Mixed Inhalants Solution This solution is supplied in two strengths, the ordinary or weak strength and the continuation or concentrated strength The commencing dose and dosage scheme is given in the instructions supplied with the solutions

In most cases, however it is better to have a desensitization solution made up
rom the different substances to which the patient has been shown to be sensitive
y clinical history and by skin tests Certain commercial firms specialize in the
eparation of such specific solutions or vaccines and the author has found some
these preparations very satisfactory The strength of the desensitizing solution
l the length of the course of treatment depends to some extent on the degr

sensitivity of the patient With an extremely sensitive patient, as shown by skin tests, the initial solution must be kept very weak and succeeding stronger vaccines given until the required effect has been obtained With moderately sensitive patients two courses of vaccine, a weak and a strong are required and for less sensitive patients the weak course may be omitted without untoward reaction

DOSAGE

The initial dose should be of that strength which just fails to cause an increased local reaction, compared with a control of carbol saline solution, on intradermal injection of 0 05 millilitre, into the patient The injections are given subcutaneously or intramuscularly into the upper arm, the gluteal region or the external thigh with the usual precautions

The dosage of the vaccine is increased from an initial dose of 1 minim by 1 minim once or twice a week until a dosage of 20 minims is reached when 1 minim of the stronger course (which is 10 times the strength of the weak course) may be given For the first few doses of each course 2 or 3 minims of 1 1 000 adrenaline are added to delay absorption and lessen the likelihood of any reaction

In most cases of predominantly extrinsic asthma, only one full course of injections is needed if the environmental contacts can be well controlled In the more severe cases, especially of dust sensitivity, further courses at yearly or 2 yearly intervals may be required, or the immunity can be maintained by a monthly injection of 15–18 minims of the strongest solution used

REACTIONS

Reactions may be either local or general and may be due to the adrenaline or to the extract itself Adrenaline reactions usually come on at once The patient becomes pale and faint, the heart palpitates and there is tremor of the hands weakness of the knees and a sinking feeling in the pit of the stomach These symptoms soon pass off if the patient lies down and is given a drink of water The adrenaline reaction may be prevented or lessened in sensitive patients by instructing them to take a tablespoonful of glucose half an hour before the injection and to suck glucose sweets during the injections

The true local reaction is seen by redness at the site of the injection with some stiffness and swelling It is most common with the larger doses and usually comes on a few hours after the injection and lasts for 24–48 hours If severe, the same dose should be given next time rather than increasing the dose

General reactions are extremely rare, they are much more important and may, *on occasion, be severe They are most likely to be severe* if the solution has been accidentally injected into a vein This must be carefully avoided by withdrawing the syringe plunger after inserting the needle to ensure that the needle is not in a vein The general reaction most commonly manifests itself by itching at any part of the body, with urticaria or even a severe attack of asthma or of angioneurotic oedema Such general reactions indicate overdosage The next dose should be smaller than the dose which gives the reaction and the succeeding doses should be increased in size more slowly

At the first sign of a general reaction 5 minims of 1 1,000 adrenaline should be injected subcutaneously and the injection should be repeated as often as necessary

pillow covered over the ticking with some such airtight covering as jaconet or plastic is useful when several pillows are needed It must be remembered that all feathers must be removed from the bedroom in feather sensitive cases Not in frequently it is found that the wife has retained her feather pillow while the affected husband has a rubber one This inability of many patients for logical thought, emphasizes the need for a detailed discussion of methods of clearing the bedroom of dangerous allergens

The subject of the clearance of the bedroom from dust and feathers has been discussed at length because these are the most common allergens Any other allergens as shown by the skin tests should likewise be excluded as much as pos sible from the environment and any foods to which the patient is sensitive must be avoided

As it is impossible to avoid wholly such things as house dust desensitization is usually necessary and will be described below The author usually prescribes an antispasmodic medicine to be used prophylactically under conditions which make an attack likely The formula recommended is the following which is marketed under the name of Linctus Anti Asthmatic The dose is ½–2 teaspoonfuls at bed time according to age

Pseudo-ephedrine hydrochloride	1 gr	60 mg
Tincture of Stramonium (*B P*)	15 min	1 ml
Syrup of wild cherry	60 min	4 ml
Syrup of Codeine Phosphate (*B P C*)	60 min	4 ml

This mixture is given last thing at night whenever the patient has been upset or over excited

respiratory

has passed

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SPECIFIC DESENSITIZATION OR HYPOSENSITIZATION

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and

chi

for the treatment of asthma Most of them are well tried combinations of one or more of the drugs mentioned above and depending on their composition are of greater or less value in different cases Linctus Anti Asthmatic of which the formula is given above is an excellent mixture for use 4 hourly especially at night

If the attack is severe, drugs by mouth are usually not sufficient to give relief and other methods must be tried A first essential however *is to reassure the patient and* relations that all will be well A confident attitude on the part of the physician goes far to eliminate the fear which is always present and this reacts well on the condition

ADRENALINE HYDROCHLORIDE

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chloride subcutaneously should bring relief within a few minutes If necessary the injection may be repeated every 5–10 minutes for 3–6 doses or even more

The adrenaline may also be inhaled from an atomizer In this case the solution should be used at a strength of 1 100 A number of mixtures of adrenaline atropine and other antispasmodic drugs for use in inhalers are on the market and appear of greater value in some cases than adrenaline alone To use the atomizer the patient holds the nozzle of the instrument just within the mouth squeezes the *bulb and inhales at the same time This may be repeated for 5–30 breaths if* neces sary The lips should remain open all the time the atomizer is being used Some atomizers are provided with a face mask fitting over the nose and mouth This is not necessary and unless it fits well may direct some of the inhalant mixture into the eyes with unpleasant side effects The use of an inhaler is a simple method of treatment and quite satisfactory for occasional use but many patients tend to depend on it more and more and use it many times in the 24 hours The effect of the inhalation is to cause rapid vasoconstriction and hence shrinking of the swollen

difficulty in expectoration and more dyspnoea especially on exertion If this is explained to the patient then the inhaler or atomizer takes a very useful place in the relief of asthma

The action of injected adrenaline may be prolonged by administering it in the *form of adrenaline (1 500) in oil or in gelatin* in a dose of 4–16 minims (0 3–

millilitre) 20–30 minutes

ompound of adrenaline

one dose may last for

6–10 hours

If the patient gets repeated severe attacks and especially if he lives at a distance from the physician he may be taught to use a syringe and to give himself injections of 2 5 minims of 1 1 000 adrenaline Again it is best if the patient uses anti spasmodic drugs for regular use and reserves the *injections for emergencies*

soon after the injection Thus the rule should always be that the patient must wait in the surgery for at least half an hour after any injection

TREATMENT OF THE ACUTE ATTACK

If the attack is mild then it can usually be controlled by oral administration of antispasmodic drugs

Ephedrine Hydrochloride

This drug, given in doses of $\frac{3}{8}$–$\frac{3}{4}$ grain for the adult, is very useful, especially in

4 hours

Ephedrine hydrochloride	$\frac{3}{8}$ gr	24 mg
Soluble phenobarbitone	$\frac{1}{2}$ gr	30 mg
Caffeine (alkaloid)	2 gr	0 12 g

In addition to wakefulness at night ephedrine, if used in too large a dose or taken too frequently, often causes gastric upsets, loss of appetite, palpitations or a general feeling of 'jitteryness' In elderly patients it may also cause a temporary retention of urine or increased frequency of micturition owing to its action on the bladder musculature

Xanthine Derivatives

The late Sir Arthur Hurst considered Monotheamin (theophylline monoethanolamine) 3-grain Pulvules or Monotheamin and Amytal Pulvules) to be one of the great advances in the drug therapy of asthma in recent years One or two pulvules are taken 4-hourly

Cardophylin (aminophylline, theophylline ethylenediamine), given in doses of 1½–3 grains 4-hourly, has a similar effect to Monotheamin Cardophylin in suppository form is very useful in cases in which the oral use of the drug causes gastric irritation

Expectorants

When there is much viscid mucus present, potassium iodide is of value The following prescription may be given 4-hourly to adults

Potassium iodide	4 gr	0 25 g
Tincture of stramonium	15 min.	1 ml
Ethereal tincture of lobelia	15 min	1 ml.
Syrup of wild cherry	30 min	2 ml
Water, to	240 min	15 ml

Antihistamine Drugs

Inhalations of oxygen and especially of a mixture of 80 per cent helium and 20 per cent oxygen are of value in some cases The mixture is not available in Great Britain but is used frequently in the United States of America The replacement of the heavy gas nitrogen, of the air with the light gas, helium increases the diffusion rate of the gas almost threefold, so that cyanosis is lessened and breathing needs much less effort

When all other measures fail, anaesthesia may be induced The least harmful method is with rectal ether Half an ounce of ether and half an ounce of pure

quantities, depending on the body-weight The patient often becomes adrenaline sensitive again after this narcosis

OTHER MEASURES

*Apart from the symptomatic treatment of the attack, only the long term treat*ment of patients with largely or wholly extrinsic asthma has so far been discussed

Cases of intrinsic asthma may be subdivided into those with a bacterial sensitivity or infection and those in which psychological factors are of paramount importance

in most of these cases results are poor Most children are much better at a boarding school than at home with an over anxious or fussy parent

tion persists, then a bacterial vaccine prepared from respiratory bacterial invaders especially streptococci, may be worth while As skin testing for bacterial sensitivity is quite unreliable the organisms chosen may or may not be the sensitizing ones Of course any local focus of infection in teeth, tonsils and sinuses should be dealt with and organisms cultivated from such infected foci should be used for the vaccine

... used must be very small and great care must

twice a week, increasing slowly

18–20 weeks If there is the slightest local reaction the dose should be kept at the same level until no reaction occurs

PENICILLIN

As most of the bacteria implicated in respiratory infections are penicillin ... worth a trial in

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tablet (Neo Epinine or Neodrenal) is placed under the tongue and allowed to absorb there The benefit is obtained in 5 minutes In a few persons side-effects such as shakiness and palpitations similar to those of adrenaline are experienced

Barbiturates are probably the best sedatives in cases of asthma The over whelming consensus of opinion is that morphine should never be used because of its depressant effect on the cough reflex and on respiration It is a well-established fact that a single injection of morphine may cause death in an allergic subject (*see* Toxicology page 1246) Codeine is less depressant and may be used

TREATMENT OF STATUS ASTHMATICUS

If the attack fails to respond to repeated injections of adrenaline and to the other measures as outlined above then it can be considered to fall under the classification of status asthmaticus a condition in which severe asthma may continue uninter ruptedly for days or even weeks and fatal exhaustion may possibly occur This

[illegible]

drug is not yet settled It is injected intravenously $3\frac{3}{4}$ grains (0 25 gramme) dis solved in 10 millilitres of physiological saline solution are injected very slowly At least 5 minutes should be taken for the whole [illegible]

[illegible]

[illegible] nausea and vomiting The faster the injection the more prominent are these effects If necessary the same dose may be repeated In dehydrated and exhausted patients one or two pints of 5 per cent glucose saline solution with the Cardophylin added [illegible]

[illegible]

Recently pethidine (demerol hydrochloride ethyl methylphenylpiperidine car boxylate hydrochloride) has been used with good effects and is worth a trial if Cardophylin fails From 25 to 100 milligrams are injected intramuscularly Side-reactions such as dizziness nausea vomiting and headache are not uncommon

PRE OPERATIVE

Nasal sinus infection, if it is present, must always be treated before operation It should be borne in mind, however, that in the presence of infected bronchiectasis permanent cure of such sinus infection is unlikely, especially if the patient has to undertake postural drainage Nowadays, by means of postural drainage and by preliminary treatment with sulphonamides and penicillin, pulmonary infection caused by the bronchiectatic disease may be reduced to such an extent as to make operation safe in patients who a few years ago would have been regarded as beyond the help of surgery

SURGICAL

Once the disease is established and irreversible—and even in the absence of

remove the danger of metastatic infection, such as brain abscess

The development of modern chest surgery, together with the use of the sulphonamides and of penicillin, makes operation in properly selected patients both feasible and, on a long view, life saving For strictly unilateral disease, the removal of one or more lobes, or even total pneumonectomy, is now a reasonable procedure and the post operative capacity for life and work is excellent Even when there is bilateral disease it may be possible in selected children and young persons to remove successfully one or two lobes on one side, and later, after an interval of 6 months or a year to remove a diseased lobe on the other side Clearly this calls for careful study by

together with an assessment of

king the

of lung

Equally clearly, each case must be considered on its merits by an experienced, expert thoracic team

PALLIATIVE

Operation may not be feasible when the disease is too extensive, when the patient is too old for the severity of the necessary surgery, when the respiratory reserve has been seriously and permanently diminished or when the patient s general condition makes him a poor surgical risk ' Palliative treatment is then all that is possible This consists in building up and maintaining the general resistance in avoiding respiratory infections, or in treating them immediately and strictly when they occur, and in ensuring adequate drainage of the infected tubes and cavities Ideally the patient should live in a dry and equable climate, avoiding cold winds and fog His daily work should be well within his limitations of capacity If heavy manual work or daily journeys in hilly country make him breathless he must alter his life accordingly He should avoid, if he can catarrhal and infective contacts on crowded buses, trams or trains

therapy usually lessens the amount of sputum and causes marked improvement in bacterial cases

RESTORATION OF CHEST SHAPE

Many patients with repeated attacks of asthma show a considerable deformity of the chest due to the over-expansion of the chest and to the distortion due to excessive muscle action on the developing bones In these cases much can be done to restore the chest shape and to improve the power of respiration by special breathing exercises These are detailed in a small booklet published by the Asthma Research Council, King's College, Strand, London, W C 2, entitled *Physical Exercises for Asthma* To ensure that they are properly carried out these exercises should be taught in the first place by a trained physiotherapist

CONCLUSION

It can thus be seen that each case of asthma is an individual problem The different causative factors must be assessed and each factor dealt with separately It is only by such an individual approach, making the treatment or treatments fit the particular circumstances of the patient, and not trying to fit the patient into a

C J C. BRITTON

BRONCHIECTASIS

Bronchiectasis is essentially a mechanical state of cylindrical or saccular dilatation of the bronchial tubes Often it follows pulmonary collapse, from obstruction of a bronchus to a lobe or to a sector of a lung In the absence of accompanying infection and inflammation, there may be no revealing symptoms, and the condition may be discovered only by bronchograms

coughing into healthy bronchi These, in turn, may become obstructed, with resulting bronchiectasis

TREATMENT

COLLAPSE OF LUNG

It is of first importance to prevent pulmonary collapse, and to deal effectively with it, if and when it develops, before permanent irreversible changes are established (*see* page 382) This danger must always be in the mind of the doctor when a patient, particularly a child, has persistent nasal sinus infection, or measles, or whooping-cough, or broncho-pneumonia, or respiratory trouble after anaesthetics, or tuberculosis of the intrathoracic lymph nodes Even an infected foreign body or plug of secretion may be removed early enough to make complete recovery possible, provided that it is done before serious damage has been suffered by the bronchial walls and the lung parenchyma

order to discover the nature of the infecting organism or organisms and their sensitivity to sulphamerazine and penicillin *It is urgent to treat such infection at its onset*, first by sulphamerazine (*see* page 42), and if there is no response within 30 hours, by penicillin (*see* page 30)

General Measures

The patient with bronchitis should stay strictly in bed Usually he will be more comfortable propped up with pillows rather than lying flat The air of the room should be warmed to between 60° and 65° F , and, during the dry congestive stage of the illness, it should be kept a little moist by means of a steam kettle Coughing is painful, and the chest feels raw behind the sternum Copious hot drinks, includ

iodide, 5 grains, should be added

Sodium citrate	30 gr	2 g
Solution of ammonium acetate	60 min	4 ml
Syrup of tolu	30 min	2 ml
Camphor water, to	½ fl oz	15 ml

Sleep is especially important and is not easy to obtain when the cough is dry, frequent and tearingly painful In addition to the above measures, 10 grains of Dover's powder (together with 5 grains of aspirin if there are general aches and

To those who are accustomed

If the bronchitis spreads to the narrower bronchi, the constitutional symptoms

flags,
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infection and the supporting of the patient's strength by the measures already described, used faithfully and with judgment, are the main safeguard against breakdown

Diet

In the earlier stages, the patient seldom wishes for solid food Hot drinks, such as tea, fruit juices, warm diluted milk, or simple water, with added glucose, are

such as
petite
putum
vever,

bronchial spasm makes coughing still difficult, and calls for a mixture such as that

Postural drainage

Postural drainage, properly carried out and persisted in, may help greatly to reduce the infection in the diseased lung The patient must be instructed in the *position best suited to allow the secretions to drain from the affected bronchi* towards the trachea and mouth, and he should deliberately clear the bronchial tree 2 or 3 times a day or more according to the amount of secretion which accumulates Hot alkaline drinks and an ephedrine mixture, taken about 20 minutes before the manoeuvre, will loosen the phlegm and help him to cough it up

Penicillin

Vaccines

As might be expected from the pathology of the disease, vaccines made from the organisms present in the sputum are ineffective

BRONCHITIS

ACUTE

episode in one of the infective fevers such as measles or influenza, or it may follow exposure to irritant fumes or gases. It may be secondary to suppuration in the nasal sinuses or the lungs, or it may be a troublesome complication of pulmonary tuberculosis The further the infection extends down the bronchial tree, the more *serious is the general bodily disturbance.*

TREATMENT

General Principles

The principles of treatment, therefore, are to deal, if possible, with the primary cause, to adopt the appropriate measures of treatment in the early "dry" stage, and

bronchi or lungs If sufferers from the common cold would but stay indoors for a day or two, acute bronchitis would be much less common

Specific Treatment

Infection by secondary invaders such as streptococci, staphylococci and *Haemophilus influenzae* is always dangerous The sputum should therefore be examined in

possible, the determining factor must be eliminated—rickets, unhealthy tonsils and adenoids, pus in the nasal sinuses, infected bronchiectasis, exposure to dust or irritant fumes and so on

A careful régime is essential Overheated, stuffy rooms, over smoking, over feeding too much alcohol, damp and foggy environment, and dusty occupations are all bad for the bronchitic He may be well advised, indeed it may be essential to give up tobacco smoking altogether, because the mucous membrane of the respiratory tract may have become sens

cod liver oil or of vitamins A and D may do good

Medicinal

Medicinal treatment should be as simple as possible, for the digestion of the

sodium iodide, tincture of lobelia and ephedrine (*see* Cough, page 369) is advisable, though it should not be continued longer than necessary, for it may upset the digestion If the sputum becomes purulent, a course of sulphonamide or of penicillin should be given without hesitation, to combat the superadded infection and to cut short, or abort, the troublesome complication of purulent bronchitis If the

one of the mercurial diuretics, together with venesection if the indications are present to justify it (*see* page 165)

Preventive Measures

Vaccines have no proved value Far more effective against respiratory complications is the avoidance of contact with known sufferers from acute coryza or with crowds at the theatre or cinema at times when respiratory epidemics are prevalent, the immediate treatment of a cold by rest and other suitable measures, and sulphonamide or penicillin therapy whenever a secondary respiratory infection with fever becomes established

COMPLICATION

Emphysema nearly always complicates the clinical picture, and forms with chronic bronchitis a particularly vicious circle, it may need additional therapeutic measures (*see* page 371) For patients whose disease is not too far advanced, breathing exercises may be helpful provided that they are not so vigorous as to exhaust the patient or lead to discomfort and breathlessness

prescribed below It should be administered every 4 hours and a tumblerful of hot water or hot tea should be given immediately afterwards

Sodium iodide	5 gr	0 3 g
Tincture of lobelia	5 min	0 3 ml
Ephedrine	¼ gr	16 mg
Chloroform water, to	½ fl oz	15 ml

AFTER-TREATMENT

It will be a week or so before the temperature is normal and the expectoration thin and watery Not until the cough and expectoration have ceased should the patient be allowed up in his bedroom, and then only if he himself feels up to it A few days later, provided the house is warm, he can be allowed into other rooms His progress and the weather should then determine when he can be allowed out of doors Relapses are common, a tickling cough may be difficult to get rid of, and therefore an adequate convalescence is essential A change of air to some equable sheltered spot may be well worth while Once again, let it be underlined that this is a disease of weeks rather than of days

COMPLICATIONS

If the infection extends to the bronchioles the treatment becomes that of broncho-pneumonia Widespread bronchiolitis produces the clinical picture of "suffocative catarrh," with grave prostration, and early peripheral circulatory failure

CHRONIC BRONCHITIS

AETIOLOGY

Chronic bronchitis is not often the result solely of repeated attacks of acute bronchitis, usually it is secondary to other diseases of the lung though it may follow a prolonged period of exposure to dust, tobacco smoking or other irritants Most commonly it accompanies emphysema and often it complicates established asthma It may be associated with nasal sinusitis, bronchiectasis, foreign bodies in the bronchi bronchial obstruction from whatever cause, pneumoconiosis, pulmonary tuberculosis and the chronic congestion of heart failure Moreover there are certain general illnesses [illegible] catarrhal [illegible]

respiratory epidemics It tends to become progressively worse winter by winter, and superimposed attacks of acute bronchitis leave the patient still more disabled

TREATMENT

General

Faced with the picture of chronic bronchitis, therefore, the doctor must look carefully for more serious underlying conditions such as those described above If

Sodium chloride	3 gr	0 2 g
Sodium bicarbonate	10 gr	0 6 g
Spirit of chloroform	5 min	0 3 ml
Anise water, to	1 fl oz.	30 ml

Once the cough loosens and the bronchial spasm relaxes the sputum is readily expectorated, unless the patient is too feeble to clear his chest It is important for the patient not to waste his energy by vigorous coughing unless the sputum is ready to come up If there is still difficulty, he may be greatly helped if the nurse or

bout of coughing, helped by the various mechanisms described above An experienced nurse should support the sides of his thorax firmly with her two forearms at each effort of coughing It may even be of advantage to take the edge off the pain by a small dose of morphine ($\frac{1}{8}$–$\frac{1}{6}$ grain), so that he can cough more confidently

If the sputum tends to accumulate in some particular portion of the lung (for example, the bases or in a segment affected by bronchiectasis) postural coughing is adopted The patient places himself in the position which allows of dependent drainage of the affected bronchi At times vigorous percussion over the affected lobe may be called for, to help the expulsion of tenacious secretions which might otherwise remain in the diseased lung

In enfeebled patients, it is idle to hope that any drugs will directly cause the expulsion of sputum from the lungs The principles of treatment described above still hold, together with every measure that can be directed to increasing the patient s general strength, for example, it is more important to administer oxygen and combat cardiovascular failure than to give ammonium carbonate *Similarly, in* chronic bronchitis with mild infection, treatment with penicillin primarily directed against the infection may be the best way of dealing with exhausting cough

EMPHYSEMA

VARIETIES OF EMPHYSEMA

Compensatory emphysema

This physiological response to the failure of other parts of the lung to expand and become aerated may be temporary or permanent The temporary variety may follow transient collapse of the lung (for example, lobar collapse or the scattered alveolar collapse of broncho pneumonia), and it subsides with recovery from the causal lesion Permanent compensatory emphysema is typically seen after lobectomy or pneumonectomy, sometimes the surgeon will try to prevent it reducing the size of the hemithorax by some such subsequent manoeuvre as thoracoplasty

pleura to the subcutaneous tissues) both subside when the air ceases to escape

COUGH

The cough reflex is one of the cardinal defences of the lungs against the inhalation of harmful material, for this reason, chronic cough is frequently the presenting symptom of chronic nasal sinus infection It may be provoked not only by irritation of the sensitive mucous membrane of the respiratory tract, but also as the result of sensory impulses from elsewhere, as for example from an inflamed pleura Coughing is effective if it clears the respiratory passages It is ineffectual and indeed may be

TREATMENT

Ineffectual cough serves no useful purpose The irritating cough which arises from an oversensitive pharynx (excessive smoking, pharyngitis) can usually be relieved by abstention from cigarettes, by demulcent lozenges for example glycerin and black currant lozenges, or Sucrets, or even by warm drinks The old fashioned country remedy of linseed tea (linseed, 150 grains, dried liquorice root powder, 50 grains, boiling water, ½ pint infused for 2 hours and strained and sweetened with sugar or honey) coats the pharynx with a demulcent film and lessens the irritation In the early stages of tracheitis and acute bronchitis the dry unpro

may call for morphine, ¼ grain, provided that there is no danger in the individual patient of accumulation of secretions in the lungs

In all these instances, the irritating cough is useless because there is little or no secretion to come Sometimes, however spasms of violent coughing fail to shift sputum which ought to be expelled, either because the sputum is too viscid or because of spasm of the bronchi Here an attempt must be made to liquefy the sputum and relax the spasm The following measures are helpful (1) Steam inhalations using two parts of boiling water mixed with one part of cold water to

containing iodide and ephedrine, such as prescribed below It should be taken every 4 hours

Sodium iodide	5 gr	0 3 g
Tincture of lobelia	5 min	0 3 ml
Ephedrine	¼ gr	16 mg
Syrup of orange	20 min	1 2 ml
Chloroform water, to	½ fl oz.	15 ml

For the patient who needs to "clear his tubes' first thing in the morning the Brompton Hospital ' Hot Water Mixture" is admirable It is dispensed as follows and is taken in an equal quantity of hot water

importance to guard against respiratory infections, for the respiratory reserve is already so impaired that otherwise trivial infections are dangerous For the same

should be put quickly in hand

Bronchial spasm is often present in these patients, and an antispasmodic mixture will help to relieve it, with appreciable lessening of dyspnoea Ephedrine hydrochloride, ¼–½ grain taken 3 times daily before meals, may be of value

Some patients are helped by a tight abdominal binder, which increases the intra abdominal pressure and so raises the level of the diaphragm, giving continuous support This effect can also be obtained temporarily if the patient supports the costal margin with his hands, pushing inwards and upwards, if he does this from time to time throughout the day, for a period of a few minutes, it may give him useful even if transient relief from his respiratory discomfort Other patients *to impede rather than benefit* himself, using the manoeuvre

The impaired oxygenation of the blood often leads to stupidity and forgetfulness in the daytime, and to disturbed sleep at night Continuous oxygen administration is clearly impracticable, though it may tide the patient over a crisis, inhalation for from 15 to 20 minutes before bedtime, however, may help him to sleep more naturally, Something of the same effect can be obtained by giving 0 2 gramme of aminophylline at night This compound of theophylline with ethylenediamine stimulates the respiratory centre and the coronary and cerebral circulations A dose first thing in the morning may also be given with advantage Cardiac failure is treated in the appropriate way

Gentle abdominal massage may help to keep the muscles in tone and combat constipation In patients whose disease is not too advanced, simple respiratory ... the thorax may be advised but they

general and respiratory condition must be carefully watched, lest they do more harm than good

Because the emphysematous patient has meagre reserves even a little undue fatigue or exertion or a mild respiratory infection may place him under the misfortune of being "overdrawn at the bank" If this happens he should be made to save and put in, he should not be allowed to draw out and spend At least 3 weeks' complete rest in bed should be advised therefore, during which time he should continue with the appropriate remedial measures mentioned earlier Indeed, one or two such periods of rest, taken as a routine just before the winter, and also about January or February, will often tide him over the winter, and extend his expectation of a reasonably comfortable life

the lung and the source of supply dries up This may occur spontaneously, or may be the result of surgical intervention in the repair of a chest wound

Chronic atrophic emphysema

Chronic atrophic emphysema is a natural part of the decay of old age, and treatment (apart from the management of old age) is not necessary

Obstructive emphysema

This condition is the result of partial obstruction of a bronchus, whereby a [illegible] yet being [illegible] istribution [illegible] ostruction,

Chronic hypertrophic emphysema

The common variety of emphysema, however, is chronic "hypertrophic" vesi- [illegible]

strain on the right side of the heart With the loss of pulmonary elasticity, expiration is less complete, the more advanced the disease, the more the chest tends to remain in the position of full inspiration [illegible]

monary ventilation. He needs better pulmonary ventilation and a more adequate oxygen intake, he is progressively less able to achieve them.

There is an inherited predisposition to the development of chronic hypertrophic emphysema in some families There is nearly always an associated chronic bron- [illegible]

lished, the disease is incurable, for the damaged lungs cannot be repaired. The disease may be expected to progress, but wise and persistent treatment may slow it down and enable the patient to live a little more happily with his disabilities.

TREATMENT

PREVENTIVE

Emphysema might be prevented in some cases if the patient could always live under conditions free from factors which contribute to its development They are the same factors as lead to chronic bronchitis (*see* page 367) Early and successful treatment of respiratory catarrhs and infections throughout life would help greatly.

REMEDIAL

The patient must be content to live within his limitations, and to reduce his physical activity to such a level as will avoid dyspnoea and cyanosis A careful

When the bleeding is moderately severe, an injection of ¼ grain of morphine will probably be necessary to allay the patient's fears or restlessness It also helps to quieten excessive coughing, but in repeating the dose the doctor must avoid so diminishing the cough reflex that blood accumulates in the respiratory passages

thereafter should be given cautiously The patient can have what fluids he likes provided that they are served cold A considerable variety of drugs have been *suggested as likely to help to arrest the bleeding* but they are useless for this purpose Their only effect is to lead the patient (and sometimes the doctor) to believe that something active is being done

A profuse haemorrhage which threatens life more commonly does so because of *the hazard of asphyxia than of exsanguination Nevertheless, blood transfusion is* called for if the anaemia is severe Every attempt should be made to clear the res

a breaking-down lesion who has already been under treatment for some time has probably had an unsuccessful attempt at pneumothorax collapse made on him *Moreover, profuse haemorrhage may be the result of erosion* of an artery running through a cavity, or of a large vein in the floor of a cavity, held open by the disease itself, and short of removing the lung there is no likelihood of arresting the bleeding

The after-treatment of a patient who has had a severe haemoptysis is primarily the treatment for increased activity of the disease, together with appropriate measures to combat any resulting anaemia

HAEMOTHORAX

AETIOLOGY

Haemothorax is a very common complication of chest injuries It may follow a penetrating or perforating wound, a crush injury, a fracture of the ribs, or a laceration of the lung from a blow or from blast *The bleeding into the pleural cavity* may arise from an injured intercostal vein or artery, an internal mammary vessel, or ... blood vessels

r as

rac-

tured rib lacerates the lung air may make its way into the subcutaneous tissues

COMPLICATIONS

Apart from the shock and severity of *the initial injury itself, the* haemothorax ... when it compresses

Moreover,

a second

rapid and

HAEMOPTYSIS

The most common causes of the coughing up of blood are pulmonary tuberculosis, bronchial neoplasm and mitral stenosis The ulcerated bronchi of chronic bronchiectasis may bleed from time to time, and various other lesions in the respiratory tract may occasionally lead to haemoptysis (for example bronchial adenoma lung abscess, tuberculous disease of trachea or bronchus, chest injuries, hypertension, rupture of a varicosity in the bronchus, angioma of the lung, or intense inflammation) *Rarely an aortic aneurysm may rupture into a bronchus* Haemoptysis may take the form at one extreme of a copious and almost immediately fatal haemorrhage or at the other of "streaking' of the sputum by flecks of blood or of blood clot

In actual practice the doctor called to a patient who is coughing up blood may already be aware that he suffers from some disease which gives rise to it, such as pulmonary tuberculosis Sometimes, however, the symptom is new, raising the problem of diagnosis as well as of treatment Among the investigations necessary in a patient with unexplained haemoptysis, radiology and bronchoscopy take a high place

In the young such an initial haemoptysis is usually caused by pulmonary tuberculosis (though severe mitral stenosis must not be forgotten) In older patients it may well be the first symptom of bronchial neoplasm and should be so regarded

The danger arising from haemoptysis is only rarely that of exsanguination though it must be borne in mind that a person with chronic fibrocaseous phthisis with toxaemia cannot tolerate a loss of blood to the same extent as a healthy person Copious haemorrhage by filling the respiratory passages with blood usually puts the patient in jeopardy from asphyxia—such patients are commonly cyanotic and not pale The tuberculous patient may survive such a haemorrhage, only to be faced with the hazard of widespread and acute extension of the disease, by reason of infected material which is carried into other parts of the lungs

TREATMENT

The coughing of blood usually frightens a patient and may indeed cause him panic Reassurance and sedation may therefore be the first measures to be adopted, whatever the underlying cause Its treatment is essentially that of the disease which causes it In pulmonary tuberculosis it raises special problems which call for more detailed discussion Whether the bleeding is mild or severe, the patient should go to bed and stay there until the bleeding has ceased, as a rule, it does stop spontaneously Mild degrees of bleeding do not affect the general course of treatment, but as they may herald an increase of activity of the disease a careful reassessment of the case must always be undertaken It may be necessary, for example, to put the patient back to bed for complete rest, or otherwise to modify the treatment In some instances, the haemoptysis is the direct result of reactivation or extension of the disease caused by sun bathing In any event, even when there is no evidence of increased activity, the patient should be kept quiet and away from work for a month or more

stripped off the lung (decortication) to allow proper re expansion It has been found by experience that suction drainage helps greatly in hastening this re expansion

If the haemothorax becomes *infected*, the *pleural contents are sterilized with* penicillin, the clot and the fibrinous deposit over the lung are removed (the latter by complete decortication), the lung is encouraged to expand by active suction drainage using an upper and a lower tube, and a ' penicillin drip" is allowed to run through the upper tube, into the pleural space and out of the lower tube

The results are excellent, and it is astonishing to see how readily the fibrous tissue can be stripped off the lung in the appropriate plane, even when the lesion has become chronic With convalescence, *rehabilitating respiratory and general* exercises contribute to full recovery Throughout the illness, good nursing good food, fresh air, and, when necessary, blood transfusion will help to support the patient's resistance and morale

INHALATION THERAPY—OXYGEN, CARBON *DIOXIDE AND HELIUM*

OXYGEN THERAPY

The lungs, blood and tissues are unable to store oxygen While anoxia (lack of oxygen) persists, therefore, only the continuous administration of oxygen can restore to normal the oxygen saturation of the arterial blood For this reason, oxygen therapy is not applicable to conditions of persistent ('chronic') oxygen lack (for example, chronic cardiac failure or emphysema) though it may tide such

the anoxia is caused by profound *anaemia, for the haemoglobin, although low* [illegible] amount, is nevertheless fully oxygenated when it leaves the lungs, likewise it is of no value in peripheral cyanosis caused merely by the slowing of the blood flow [illegible] venous blood in certain

[illegible] ɔxia" caused by poisons

[illegible] h presents an emergency

amenable to oxygen therapy, arises because of deficient oxygenation in the lungs (anoxic anoxia) Any condition which interferes with the passage of air to and from the lungs, or with the gaseous exchanges in the alveoli, will produce deficient oxygenation of the blood in the pulmonary circulation Thus oxygen therapy is most likely to be successful in conditions such as pulmonary oedema, broncho pneumonia, irritant gas poisoning and the anoxia of high altitudes (caused by the [illegible] likely to be of

[illegible]

the lungs by reason of collapse or of consolidation

The amount of oxygen necessary to restore the oxygen saturation of the blood to *normal can be accurately controlled* by means of blood gas analysis This is not feasible in routine clinical work, but happily in most instances certain simple

threatening increase in the intrapleural pressure, with resulting compression symptoms

Though in the absence of an introduced foreign body or of sepsis, blood in the pleural cavity does not clot, nevertheless there is a gradual deposition of fibrin and endothelial and blood cell debris on the pleural membranes accentuated when the secondary pleural effusion develops, and particularly so when there is sepsis If therefore the blood is allowed to remain in the pleural cavity, this deposit will eventually become organized and both visceral and parietal membranes will become encased in fibrous tissue (clotted haemothorax", 'frozen lung") The

Infection of the haemothorax occurs in about a third of the cases, the blood is an excellent medium for the growth of organisms, and bacteria are readily carried in by a penetrating wound, or *via* the air passages through a tear in the lung

TREATMENT

Surgical

When the haemothorax is but an episode in a serious injury to the thoracic wall, the diaphragm or the lung (for example, a sucking wound of the chest), active surgical treatment of the emergency is called for, including the usual methods for combating the shock of the injury The haemothorax, here of subsidiary importance, is removed at the time of operation, which may involve excision of the wound track, removal of foreign material carried into the chest, ligation of bleeding vessels, and appropriate surgical repair of the injury

Medical

In patients in whom the haemothorax forms the main part of the clinical picture (' simple haemothorax", not associated with serious injury to the thoracic cage or

soon and as quickly as is consistent with the patient's safety and comfort

If there are no manifestations of compression (which may arise not only because of the blood but also because of an associated pneumothorax), the blood in the pleural space should be left undisturbed for at least 24 hours in order that any tear in the lung may become sealed Immediate aspiration should be undertaken only to relieve intrapleural tension, air being withdrawn rather than blood if there is an accompanying pneumothorax

The blood should be aspirated 36–48 hours after the injury, this should be done

In those patients in whom massive clotting occurs, evacuation of the clot is essential At the same time, any fibrous tissue layer on the visceral pleura must be

nasopharynx The outer end is then bound down to the forehead with an efficient bandage, after it has been connected to the tube coming from the cylinder The cylinder has attached to it a fine adjustment valve to control the supply, and the oxygen should be led through a simple type of flowmeter.

Oxygen tent

Oxygen tents are expensive and not readily available except in hospitals Moreover, their use calls for skilled nursing

The B L B mask

For most practical purposes the B L.B mask is as efficient as an oxygen tent, is comparatively simple to manipulate, and with a flow of 8 litres per minute it can

nose and face, the rubber strap which holds the mask in position may be placed above or below the ears, whichever is more comfortable The nasal type of mask which leaves the mouth free is preferable, but for the rare patient with nasal obstruction, an oro-nasal type is available

When the three ports of the connecting device are closed, the patient breathes *entirely from the reservoir re-breathing bag, into which oxygen should flow at a* rate which prevents it from collapsing entirely at the end of inspiration More air and less oxygen is breathed if one or more air ports are opened, the patient then breathing partly from the bag and partly from the atmosphere With a flow of 4 litres per minute and all three air ports open, the alveolar oxygen concentration reaches 56 per cent At 6 litres per minute and with all three ports closed, it reaches a concentration of 87 per cent

minutes, the mask is then pressed on the face If there are no leaks, the bag distends and collapses as before If, however, oxygen has been escaping by the sides of the

Infant tents

For small babies, masks and catheters are not practicable, and a special type of infant tent (for example, the "Queen Charlotte") is advisable (*see* page 481) It can be obtained from Oxygenaire Ltd

CONCENTRATION

As a rule, if oxygen inhalation is going to be successful, about 60 per cent alveolar oxygen concentration will be enough to relieve the oxygen lack and abolish

observations are sufficient, the appropriate dosage is that which provides relief of the cyanosis, restlessness and delirium, together with a fall in the pulse rate

A further indication for oxygen therapy is carbon monoxide poisoning In high concentrations, it displaces carbon monoxide from its association with haemoglobin, increasing the rate of elimination fourfold by comparison with ordinary air. Here, however, the respiratory centre is so poisoned by the carbon monoxide that [illegible] ...or, hence it is essential to give carbon

gas, containing oxygen mixed with 7 per cent of carbon dioxide, are available, and the [illegible]

breathing is established

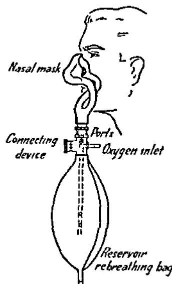


FIG 10—The B L.B mask The glass spigot at the bottom of the reservoir bag can be removed at intervals in order to drain off excess moisture

ADMINISTRATION

Oxygen is supplied in cylinders of various sizes (from 20 to 150 cubic feet capacity) The rate of flow obviously determines the length of time which the cylinder will last A rough and ready calculation of this period can be made by dividing the cubic capacity of the cylinder by twice the number of litres per minute of flow, for example, a cylinder of 100 cubic feet capacity used at a flow of 5 litres per minute will last $\frac{100}{5\times2}$ or 10 hours

The oxygen can be administered *via* a nasal catheter, by nasal tubes such as are provided by the Tudor Edwards spectacle frame carrier, by special masks such as the B L B mask, or by an oxygen tent It is entirely futile to give oxygen by a glass funnel held in front of the patient's nose and mouth

Nasal catheter and nasal tube

With the nasal catheter or nasal tubes, there is a considerable waste of oxygen during expiration, nevertheless, it is possible to treble the normal oxygen concentration in the alveolar air (from the normal 14 to approximately 40 per cent) by [illegible]

[illegible]

IRRADIATION TREATMENT

Treatment by radium or deep x-rays is not curative The latter have a place in the palliation of pleural pain caused by neoplastic infiltration *Otherwise symptoms* may be treated as they arise, and the patient should be made as comfortable as possible The treatment of secondary growths in the thorax is purely palliative

ADENOMA OF THE BRONCHUS

A less common and benign tumour is the bronchial adenoma It obstructs the bronchial lumen, and may also expand outside the bronchus, thus forming a "dumb-bell tumour" Its main danger to health is the development of chronic infection in the portion of lung distal to the growth and, for this reason, early removal is advisable If the tumour is confined to the bronchial lumen, and is pedunculated, bronchoscopic removal is indicated More often its size and extent, or distal suppurative changes in the lung, call for lobectomy or occasionally pneumonectomy

OTHER INTRATHORACIC TUMOURS

Other tumours which require the attention of the thoracic surgeon are retrosternal goitre, the various neurinomas, dermoid cyst and teratoma, chondroma, fibroma, myoma, pulmonary angioma and the rare thymic tumours

LUNG

ABSCESS

Abscess of the lung may result from blood-borne infection (pyaemic), or from extension into the thorax of infection below the diaphragm (subphrenic infection, amoebic abscess) Most arise, however, from inhalation into the lungs of bacteria or of particulate matter containing bacteria, the essential pathological picture is that of a destructive necrotizing broncho-pneumonia which goes on to purulent liquefaction, and in one particular group to a gangrenous slough

AETIOLOGY

These inhalation abscesses may be caused by aerobic organisms such as strepto- [illegible] nfection with

the normal defences of the lung, in particular the cough reflex and the [illegible] mechanism

The defences may be overwhelmed with infective material, as, for example, in operations on the nose and throat, in persistent purulent nasal sinusitis, or during immersion, or they may fail to work because the patient is in coma (due to anaesthetics or to epileptic fits), or they may be nullified by an impacted foreign body or a plaque of carcinoma or intense inflammatory oedema of the bronchial walls Once the defences are breached, the battle has to be fought out in the very citadel itself—the terminal bronchioles and alveolar units of the lung

cyanosis Larger concentrations may, however, be needed for a limited period, though they should not be continued for more than 48 hours, in view of the danger of oxygen poisoning The optimum concentration at any time must be decided for each individual patient according to his condition and to his response to treatment High concentrations (of over 90 per cent) are valuable in the peripheral circulatory failure associated with shock, by increasing the amount of oxygen carried in simple solution in the plasma They also help to hasten the re absorption of air after encephalography or in subcutaneous emphysema, or in abdominal distension by gas, in these conditions, the oxygen inhalation displaces nitrogen from the blood and body fluids

CARBON DIOXIDE

Carbon dioxide (given as described earlier on page 377) may also be used in the treatment of hiccup (*see* page 739) and of post operative collapse of the lung (*see* page 383)

HELIUM

Helium was suggested as a therapeutic gas by Barach in 1934 A mixture of 20

in obstructive lesions of the larynx or trachea The author has had too little experience of this form of treatment to be able to judge it fairly It would appear to be worth trying in patients with status asthmaticus

INTRATHORACIC TUMOURS

CARCINOMA OF THE BRONCHUS

Introduction

Carcinoma of the bronchus is by far the commonest intrathoracic new growth

increase the difficulties of surgical removal On the other hand, a peripherally situated growth in one of the smaller bronchi usually presents more uncertainty of diagnosis, but offers better chances of successful removal

Surgical Treatment

For all but a few of the peripheral growths (for which removal of the affected lobe may sometimes be adequate), an extensive "dissection pneumonectomy" of the whole lung and the related lymphatic field is now possible and justifiable It

abscess To substitute the problem of localized bronchiectasis for that of abscess is hardly to be regarded as success

rubbery sponge The patient is then fortunate if the lesion is sufficiently limited to allow the surgeon to extirpate the diseased tissue

BASAL ABSCESS SECONDARY TO SUBPHRENIC INFECTION

cipl

ma

phragmatic paralysis

AMOEBIC ABSCESS

Amoebic abscess of the lung rarely calls for surgical intervention if full treatment for the amoebiasis is given (*see* section on Tropical Diseases)

COLLAPSE

In 1850, Gairdner described massive collapse of the lung and said that it was caused by a plug of mucus obstructing a bronchus For half a century this was almost forgotten, in the last few decades, however, it has become abundantly clear that absorption collapse, whether of the whole lung or of a segment of the lung is caused by *complete obstruction of the bronchus of supply*—not only by a plug of viscid sputum, however, but also by such other factors as an aspirated foreign body (including blood clot from operations on the nose and throat, or from haemoptysis), or a benign or malignant new growth, or a tuberculous gland which compresses or erodes into a bronchus Moreover, removal of the obstruction allows complete re-expansion of the collapsed lung, provided always that pulmonary infection has not meanwhile supervened

DIAGNOSIS

or heart failure

develops slowly, there may be no presenting symptoms of the collapse, though the physical signs show what has happened

PREVENTIVE TREATMENT

The first principle of treatment is to prevent, if possible, the development of collapse of the lung Operation should be avoided in the presence of active infection in the mouth or upper respiratory tract Smoking should be forbidden for some weeks

In nearly every instance (save, for example, in some of the destructive oil pneumonias) abscess of the lung is but the later stage of necrotizing broncho-pneumonia. The crucial difference between the aerobic and the putrid infections which progress to abscess formation is the gangrenous slough or sloughs which characterize the putrid abscess Some 80 per cent of aerobic abscesses are caused by streptococci, a few by staphylococci and a very few by other organisms such as *Haemophilus influenzae*.

TREATMENT

Until purulent liquefaction occurs, the illness presents itself as a serious broncho-pneumonia, and will be treated as such (*see* Broncho pneumonia, page 415) It does not respond satisfactorily to treatment, however; pyrexia and toxaemia persist and purulent sputum increases Some two weeks after the onset, maybe, the chest is examined radiologically, and the abscess cavity or cavities detected (some are revealed only by tomography) Intense broncho-pneumonias of this kind are particularly seen in the graver influenzal epidemics, in which there is frequently virulent secondary infection

Simple Pyogenic Abscess

hope of cure, by continuing intensive treatment with sulphonamides and penicillin; the margin of safety is greater Patience is justified so long as the general condition of the patient is improving and the cavity is seen to be progressively shrinking Comparatively few of these abscesses call for surgical intervention

Putrid Abscess

The putrid abscess is far more dangerous From 10 to 14 days after the onset of the illness (called, perhaps, influenza, or recognized as pneumonia), the patient

The productive reaction, seen typically in the epithelioid tubercle, is a less acute form of inflammation This lesion also may become caseated, or it may undergo fibrosis, it is "benign" only when it fibroses and heals successfully The exudative lesion occasionally is benign and resolves, all too often, however, *caseation occurs* and cavities develop

In primary infection with the tubercle bacillus, a small exudative focus develops in the lungs Typically, it undergoes rapid caseation, and many of the infecting bacilli escape to the draining lymph nodes, which themselves become rapidly and massively involved in the tuberculous process With the development of acquired resistance, the caseating focus becomes encapsulated by fibrous tissue, the bacilli become scanty, and later the focus is infiltrated with lime salts If resistance is poor and allergy to tuberculoprotein high, caseation is liable to be extensive, and the caseated material readily undergoes liquefaction This in turn leads to cavity formation, the tuberculous pus being coughed up as soon as the excavating focus extends sufficiently to establish connexion with a bronchus Meanwhile the normal tissue, stimulated by the exudative reaction, attempts to wall off the inflammation by means of fibrosis

In primary infection, cavitation is a relatively late development, occurring when the tissues have already become sensitive in response to the infection Mostly there is recovery from the disease without cavitation happening, though a varying degree of immunity and of sensitivity to tuberculoprotein remains If, later on in life, there is reinfection with a sufficient dose of tubercle bacilli, the typical reaction is one of caseation, ulceration and cavitation on the one hand, and an attempt to repair the damage by fibrosis on the other Which of these predominates depends on the balance between the patient's resistance and his sensitivity Moreover, the structure of the lung itself does not favour the elimination of necrotic material Once a cavity occurs, the tuberculous pus (together with any tubercle bacilli) is easily aspirated into other portions of the bronchial tree, either during respiration or especially during coughing, to give new and acute extensions of the disease

Cavitation is therefore a grave menace to the patient The majority of cavities do not close and heal by natural means, for the bronchus or bronchi which open into them are involved in the tuberculous inflammation, and are narrowed either by granulation tissue, or by submucous infiltration, or by submucosal hyperaemia Usually the stenosis is not complete, and air can enter the cavity during the stronger inspiratory phase of respiration, in expiration, however, the swollen walls come together, air which enters during inspiration cannot be expelled completely during expiration, and there is a degree of tension within the cavity which will depend on the severity of the stenosis and on the elasticity of the cavity wall If the stenosis increases and the elasticity of the wall remains the same, the cavity may increase considerably in size, a good example is the "distension cavity' which is sometimes produced by the induction of a pneumothorax

This positive pressure or tension will embarrass the blood supply to the cavity wall, and so hamper the local defences Not all cavities are tension cavities how ever, some consist of ragged holes without any defined wall, in an area of acute caseous pneumonia, some have a thin wall of young fibrous tissue around *them* some are old, with thick fibrous walls, but all of them are dangerous

before any anaesthetic Ill-conceived and excessive medication before operation, *which may conduce to the accumulation of tenacious secretion or abolish the* cough reflex, must be avoided Atropine may make the secretions viscid Too much morphine may weaken the defensive mechanism of coughing, especially in old people,

humidification of the air (as by a steam tent) helps to keep the secretions fluid

REMEDIAL TREATMENT

If obstruction does occur, an attempt should be made to liquefy the secretions and to assist effective cough iodides, warm alkaline drinks and antispasmodics (for example, ephedrine) should be given Percussion postural drainage, with the affected lung uppermost—percussion with the palm of the hand being made over the collapsed portion of lung—may result in the coughing up of the occluding plug It is often effective to combine heavy percussion with Sante's manoeuvre, in which the patient lies on his back, and is then rolled to and fro about a dozen times,

carried out, and effective cough is established, it helps to prevent stagnation of secretions in the dependent bronchi

Bronchoscopic removal of the offending plug is not always as successful in practice as it appears to be in theory The sputum may have been sucked into the peripheral bronchi out of the reach of the bronchoscope Nevertheless, if the more simple measures have failed to re-establish the airway within 48 hours, a thorough and expert attempt must be made to clear the bronchus under direct vision

In extensive collapse, with great pain and dyspnoea, marked mediastinal dis placement, and a high negative intrapleural pressure, dramatic relief may be obtained by a temporary artificial pneumothorax, to restore the intrapleural pressure to normal It abolishes the pain caused by the drag on the mediastinum, diminishes the suction traction on the bronchi, and gives the patient back his power of effective coughing The danger of secondary infection of the collapsed lung is considerable, for this reason prophylactic chemotherapy is advisable

PRIMARY TUBERCULOSIS

PATHOLOGY

The primary focus of tuberculous infection in the lungs is a response to inhaled bacilli which settle and multiply in the wall of a small bronchiole and produce the

the lesions in the lymph nodes become encapsulated and later infiltrated with lime

it will save his energies appreciably This is essential in acute lesions with pyrexia and toxaemia, it is advisable in all patients who are put to bed for the special purpose of assessing the seriousness of their disease.

On the whole, the initial treatment by strict rest in bed is best carried out in hospital or a good sanatorium At home, there are usually too many unavoidable disturbances (visitors, telephone messages, family or business worries) which interfere with absolute rest If the patient has to be treated at home, the doctor must explain the full implications of rest in bed, and exact a rigid discipline When absolute rest is necessary, an hour out of bed may well undo the good of the other 23 hours, for that hour's exertion may re open bronchi into cavities which otherwise would have stayed closed

[illegible]

response of the patient to treatment If there is evidence of toxaemia (for example, pyrexia, tachycardia, fatigue), or of cavitation, a minimum of two months' absolute rest is called for, as long as toxaemia continues, rest is essential

With adequate rest, early infiltrative lesions may resolve or fibrose, a few small cavities may heal completely and others show improvement, and often there is striking amelioration of constitutional symptoms When the temperature and pulse rate have become normal, when fatigue and lassitude have subsided, when the [illegible]

of temperature or increase in the pulse rate or any other evidence of toxaemia, the period can be extended until he is out of bed for 2, 4 or 8 hours in the day When he is well enough to be up for the whole day, he must avoid the temptation of over-exertion, learn how to conserve and build up his strength, observe at least 2 periods of absolute rest in the day (of 1 hour each), and take seriously any symptoms which might indicate renewed activity of the disease A good sanatorium educates him in these details of daily regimen, and gives him the principles by which henceforward he must live

FRESH AIR AND DIET

Fresh air and good food are the other ingredients of Nature's *vis medicatrix* The tonic effect of fresh air depends on its free circulation, on its cleanliness and on its freedom from dust, germs and excessive moisture Good food means an adequate, well-balanced diet, adapted to the patient's needs, digestible and with proper first-class (animal) protein and vitamin content

In the past much has been made of climatic treatment This, however, is of little importance compared with the prime necessities of rest and prolonged medical supervision Indeed, as long as the criteria of 'fresh air" are fulfilled, there is much to be said for treating the patient in the country and climate in which he will have to live and work when his disease is arrested

MEDICINAL TREATMENT

During the last few decades, innumerable chemical compounds have been tried for pulmonary tuberculosis Sometimes they promise well in experimental animals,

The spread of tuberculous disease in the lungs may be by a slow but relentless growth of foci, or by acute extensions and therefore dramatic episodes of illness. On the other hand, the processes of healing are always slow. Exudative lesions may occasionally resolve, apparently quickly if the x-ray appearances are to be [illegible] foci [illegible] ather [illegible] ncap-sulation of a caseous focus has been achieved, living tubercle bacilli may still [illegible]

[illegible] may persist long after symptoms, signs, and x-ray appearances suggest that the patient has nothing more to fear

TREATMENT

[illegible] point is that unless cavities are closed, the patient remains in jeopardy.

Rest

Rest is the very foundation of all treatment of active pulmonary tuberculosis. The amount and duration of it will be determined by the seriousness of the disease. Complete rest in bed ensures quiet shallow respiratory movements, encourages healing *and diminishes toxaemia It lessens the inspiratory pull on the diseased bronchial* walls, and so favours closure of these bronchi during all phases of respiration. If this persistent closure can be achieved, absorption collapse follows, and any cavities which they supply will close Given enough time under these favourable conditions, the diseased bronchial wall will cicatrize, and with good fortune the bronchial lumen will remain permanently obliterated. Unfortunately, however, most cavities (some 80 per cent) fail to close under this "passive relaxation" of rest in bed alone.

Rest in bed does not mean merely staying in bed The ideal to be aimed at is a reduction of the patient's oxygen requirements, and therefore of his respiratory excursions, to the very minimum He must learn to relax his muscles and to avoid any unessential muscular exertion for the whole 24 hours of the day Moreover he must be made aware that bodily relaxation is impossible if the mind is not at rest, and so he must achieve equanimity In the seriously ill, and indeed even in the mildly febrile, a blanket-bath given by the nurse should take the place of a visit to the bathroom, and a bed-pan should be used when the bowels act Later, as the patient improves, he can be permitted to use a commode in the bedroom, and later still, when he has been allowed up for some hours in the day, he can be allowed to visit the bath and lavatory If in the early stage of rest in bed he can be fed by a nurse

wall, not only will relaxation of the lung and bronchi be prevented, but inspiration may actually increase the size of the lumen through the pull along the line of the adhesion Any other methods of collapse should as far as possible attempt to reproduce concentric relaxation of the diseased lung

Acute exudative disease contra indicates any form of collapse therapy, even artificial pneumothorax, and taken by and large, any lesions which are predominatingly exudative should not suffer surgery The reason for this is that in the exudative phase *the patient's resistance is at its lowest* Any serious impairment of vital capacity, whether because of extensive bilateral disease or of chronic bronchitis and emphysema, or of cardiac or other serious disability, makes further

forbid them, moreover, the patient's general resistance should be reasonably good

It has already been indicated that collapse therapy, especially operative interventions, should whenever possible be carried out when the patient s resistance is at its peak The majority of patients, even though their disease may appear to remain reasonably stabilized, are likely at some time or other to have a relapse, with toxaemia and extension of the lesion As a rule such a renewal of activity forbids surgery, which should be delayed until the activity has subsided There are,

with special attention to the presence, nature and persistence of cavities

may reveal unsuspected cavities or infiltrations, before or after operation Save in

for it may

clinical and

ate should

other things being equal, lead to delay in instituting active treatment until the rate is stabilized Assessment of vital capacity by spirometric readings is of help In special instances, it may be wise to determine the gas-exchanges in each lung separately for sometimes it is found that the patient's respiratory function depends almost entirely on the side on which operation is contemplated

CONTRA INDICATIONS

Disease elsewhere may influence the indications for or against collapse therapy Tuberculous disease of the bowel, of bones and joints or of the kidneys as a rule

but most of them fail in clinical experience and pass out of use Sulphonamides and sulphone derivatives have had some popularity in recent years, Promin, for example, is apparently effective against tuberculosis in the guinea pig, but disappointing when tried in human beings The most exciting trials recently are those of streptomycin This antibiotic stands out among the rest as having some solid success in acute miliary tuberculosis, tuberculous meningitis, and in laryngeal and tracheobronchial ulcerations No final judgment can yet be made, the use of streptomycin in the treatment of tuberculosis is discussed on page 35

resistant tubercle bacilli The suggested dose of streptomycin is of the order of 1 gramme a day, for a course of 6 weeks There is some evidence that repeated courses with intervals between do no more good than a single course, but that they do increase the resistant strains

Para aminosalicylic acid is another drug which at present is undergoing trial Already there seems to be little doubt that it reinforces the therapeutic action of streptomycin in the acute form of the disease, and that it considerably reduces the risk of the development of streptomycin-resistant strains of tubercle bacilli As yet, the optimum dosage is far from being finally agreed It seems likely that in future it will be used in conjunction with streptomycin, rather than that streptomycin will be used alone

In spite of rest and regimen, the lesion may fail to regress, cavities may persist and the disease may extend Moreover, the scar tissue which is the basis of repair

COLLAPSE THERAPY

The aim of collapse therapy is to relax and reduce the volume of the diseased lung and to fix it against the mediastinum This reduces the lung movements, obliterates cavities and thereby prevents the accumulation of secretions, and reduces toxaemia The best method of achieving relaxation of the lung is by an artificial pneumothorax, provided that the lung is completely free of adhesions to the chest wall The relaxation so obtained is concentric, and it thus readily produces a further decrease in the lumen of the bronchus and therefore tends still more to close the cavity When ideally perfect, artificial pneumothorax produces the closure of about 95 per cent of cavities, but if there is any attachment of the lung to the chest

In order to avoid the accident of air embolism, induction of the pneumothorax is made by allowing air to be sucked into the pleural space, after it is seen (by the negative pressure and by proper respiratory excursions revealed by the swing of say -10 to -5 of the manometer ...
tion, then, ...
sound side,
with the upper arm forwards and upwards, out of the way of the operator A convenient point of puncture is chosen—the fourth intercostal space in the mid axillary line, or the sixth or seventh space in the scapular line The skin is sterilized, and under aseptic precautions the thoracic wall is anaesthetized with 0 5 per cent Novocain, down to the pleura A blunt-ended cannula and trocar such as that devised by Rivière avoids the mischance of puncturing the lung Connected to the rubber tubing and to the manometer (but shut off from the air in the bottle) the cannula with trocar is pushed almost down to the pleura, the trocar is then replaced by a blunt stylet and this is then pushed through the pleura Usually a characteristic snap is felt, and with a free pleural cavity there is an immediate response from the manometer At the induction, not more than about 300 cubic centimetres of air

Henceforward refills are given at suitable intervals varying from a few days up to a week or two in order to maintain "optimal collapse'—that is, collapse sufficient to control the disease without producing adverse reactions and to prevent any undue expansion of the lung between the refills As a rule, the amount of air given at each refill should not be more than 500 cubic centimetres The ideal is to maintain an effective collapse at a constant level If refills are so spaced that the lung behaves as a concertina, needing large amounts of air to bring it back to a satisfactory relaxation, the whole object of the treatment is nullified

Duration

The duration of an effective pneumothorax must be at least 2 years and it may be considerably longer if the disease is extensive and cavities are present It must be remembered that healing of extensive disease will be at the cost of extensive fibrosis the healed lung may therefore never fully re-expand when the therapeutic pneumothorax is discontinued Most patients suffer some degree of impaired respiratory reserve after the cessation of pneumothorax some may be left with so much pulmonary and pleural fibrosis that thoracoplasty may have to be done to relieve the disabling drag on the great vessels and the overdistension of the opposite lung

Every patient is an individual problem, and there can be no rules of thumb to instruct the inexperienced in the indications for or against the establishment of a pneumothorax in any particular individual The best that can be done is to state certain broad principles on the basis of which clinical judgment must be exercised In spite of the fact that therapeutic pneumothorax has considerably improved the

forbids it On the other hand, laryngeal tuberculosis may be benefited by reason of the reduction of the amount of sputum passing over the laryngeal mucosa, and reduction of toxaemia following collapse treatment may increase the sugar tolerance in associated diabetes

ARTIFICIAL PNEUMOTHORAX

Therapeutic pneumothorax is applicable to the subacute exudative types of lesion (once they are reasonably stabilized) rather than to the fibrotic, for in the latter there is little likelihood of a pleural space free of adhesions It was first used systematically by Forlanini He established a positive pressure in the pleural cavity In 1912, Ascoli became convinced that a subatmospheric pressure gave better results, especially in allowing fuller function of the lung at the end of treat-

collapse' which depends on the lessened distensibility of diseased lung as contrasted with that of normal lung Furthermore, it has made bilateral pneumothorax feasible

The technique of artificial pneumothorax is comparatively simple, but it needs wisdom and judgment in the initial selection of patients suitable for it, in the aftercare once it is induced, and in the balancing of certain risks of treatment against the risks of the disease The early stages of treatment should be carried out in hospital or sanatorium, where the patient can be kept under continuous skilled observation, and control by skiagrams of the chest is essential during the whole course of the treatment

Risks

The main risks of the procedure are pleural shock or air embolism at the stage of induction—rare indeed if the proper technique of the operation is scrupulously carried out pleural effusion from tuberculous pleurisy caused by tearing of an adhesion, rupture of a cavity, or from extension of the disease to the pleural surface tuberculous empyema as a sequel of the pleurisy obliterative pleurisy which gradually but relentlessly produces pleural symphysis spontaneous pneumothorax, usually resulting from tearing of an adhesion and a "distension cavity" with retention of secretions inside the cavity and consequent grave toxaemia

Technique

This procedure should be undertaken only by, or under the supervision of, someone experienced in the treatment of tuberculosis The simplest and most

of air displaced is measured by the rise in the level of the fluid in this bottle Along the course of the rubber tube is an air filter A T piece junction allows another connexion to be led off to a water manometer The intrapleural pressures can be read off on the manometer after clipping off the delivery tube leading from the bottle

page 417

BILATERAL PNEUMOTHORAX

Bilateral pneumothorax may be feasible and justifiable in a small number of

of pneumothorax (in particular, spontaneous pneumothorax, pleural effusions and acute pulmonary infections) are now especially dangerous, and often lethal

When it appears that pneumothorax treatment can at length be discontinued because the lesion is healed, cessation of refills should be gradual, the dose of air being progressively reduced and the intervals between refills extended At the same time, the patient is watched carefully for any evidence of renewed activity of the lesion, or of the reappearance of cavities In favourable cases, re expansion of the

healthy lung, displacement of the mediastinum to the affected side and elevation of the diaphragm Sometimes the space cannot be obliterated because the lung has become so scarred and shrunken and the mediastinum fixed If so, the refills of air must be continued for life or the pneumothorax must be converted into an oleo thorax or the space must be obliterated by thoracoplasty The latter is probably the wisest course in most instances, but the patient must be well enough to be a reasonable surgical risk

INTRAPLEURAL PNEUMOLYSIS

In many patients it may only be possible to establish a pneumothorax which, because of adhesions between the lung and the chest wall, is unsatisfactory and clinically ineffective Skiagrams may show that adhesions are present, but often they fail to reveal those which are posterior or near the mediastinum Moreover the x ray film cannot accurately show their size or number, or indicate whether or not they contain lung tissue, blood vessels or active tubercles The thoracoscope

Clearly

collapse therapy considered, unless it is decided to try to increase the

the lung by adding a pneumoperitoneum to the pneumothorax

OLEOTHORAX

At one time, this procedure, which consists of the introduction into the pleural space of olive oil or liquid paraffin, with or without Gomenol, was fairly extensively

prognosis in a small selected group of patients suitable for it, it still holds good that strict rest in bed is the mainstay of treatment Even if rest in bed fails to secure the

indications that there may be to it

lung) must be promptly abandoned it is useless and may even be harmful and it gives the patient an altogether false sense of security

COMPLICATIONS OF ARTIFICIAL PNEUMOTHORAX

The commonest complication of artificial pneumothorax is pleural effusion, the result of tuberculous infection of the pleura either by extension of disease from the underlying lung, or from tearing of an infected adhesion, or from rupture of a cavity It may vary in amount from a small collection in the costo phrenic angle, to one which fills almost the whole pleural space The general principles governing the treatment of tuberculous pleural effusions are to be found on page 407 Here fluid and air are together in the pleural cavity, each exercising certain mechanical effects

Most of these effusions remain serous during their course, and the larger ones may cause mechanical distress, many of them are slowly absorbed, some few gradually change into tuberculous empyema, some appear to initiate the development of obliterative pleur

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sidiously or accompanied by an obvious relapse of illness, if by any chance a refill is given before the effusion is recognized, it is found that whereas hitherto the space would take 500 cubic centimetres of air with little change in the pressures, now 100 cubic centimetres may bring the mean pressure on to the positive side of zero Is it better to leave the fluid or to take it off and replace with air? Opinion and

pressure in the space and causing respiratory embarrassment, the wiser procedure is to draw off enough air, rather than fluid, to restore the mean pressure to normal

Tuberculous empyema, as a result of heavy tuberculous infection of the pleural space from rupture of a caseous focus or cavity under the pleura or at the visceral attachment of an adhesion, is treated according to the principles suggested on page 409

page 417

BILATERAL PNEUMOTHORAX

Bilateral pneumothorax may be feasible and justifiable in a small number of carefully selected patients, for the normal respiratory reserve is so great that it is possible, in spite of the functional impairment, to collapse each lung to about half its volume without putting the patient in jeopardy Nevertheless, any complications of pneumothorax (in particular, spontaneous pneumothorax, pleural effusions and acute pulmonary infections) are now especially dangerous, and often lethal

When it appears that pneumothorax treatment can at length be discontinued because the lesion is healed, cessation of refills should be gradual, the dose of air being progressively reduced and the intervals between refills extended At the same time, the patient is watched carefully for any evidence of renewed activity of the lesion, or of the reappearance of cavities In favourable cases, re-expansion of the lung (which at best is limited by some degree of scarring) is augmented by certain mechanical adjustments which make possible the obliteration of the pleural space These adjustments are retraction of the thoracic wall, compensatory expansion of healthy lung, displacement of the mediastinum to the affected side and elevation of the diaphragm Sometimes the space cannot be obliterated because the lung has become so scarred and shrunken and the mediastinum fixed If so, the refills of air must be continued for life or the pneumothorax must be converted into an oleothorax or the space must be obliterated by thoracoplasty The latter is probably the wisest course in most instances, but the patient must be well enough to be a reasonable surgical risk

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OLEOTHORAX

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used without sufficient appreciation of its disadvantages It may cause severe

thorax It may sometimes help to delay premature obliterative pleurisy which threatens to ruin an otherwise satisfactory pneumothorax Its main value however, is to maintain the good of a successful pneumothorax in a patient who is compelled by circumstances to move to some place (for example abroad) where air refills

DIAPHRAGMATIC PARALYSIS

Diaphragmatic paralysis produced by temporary (crushing) or permanent

power of coughing and so with the defences of the lungs against infection If it fails to produce closure of cavities and thoracoplasty becomes necessary the risk of collapse of the base of the lung during the major operation is doubled or trebled Following crushing of the nerve for temporary paralysis in some 3 per cent of

aerate such normal tissue as remains in the diseased lung

Indications

The patients submitted to this operation should therefore be chosen with great discrimination and only when there is a solid expectation of a successful result The operation may be of value

(1) For apical cavities not more than 2 centimetres in diameter with relatively little surrounding infiltration in patients whose disease is not of long standing

(2) In the presence of an artificial pneumothorax when the apex of the lung is attached to the pleural dome the base to the diaphragm and when there are no lateral adhesions The lung is thus stretched in a vertical axis and with relaxation of this pull cavity closure can be expected in about 90 per cent of patients

(3) For cavities in the lower lobe both in the apical segments and in the basal segments Here satisfactory results can be expected in only a small percentage apart from a perfect artificial pneumothorax however this applies to the bulk of relaxation procedures and therefore this simplest of them is worth trying It should be supplemented by the introduction of air into the peritoneum (pneumoperitoneum) for this may increase the ascent of the paralysed diaphragm by 2 or 3 rib spaces Pneumoperitoneum however does tend to increase the duration of the paralysis and consequently it should be used with discretion Experience suggests a further use of pneumoperitoneum in patients with a paralysed diaphragm in that it probably

prevents paradoxical movements and so is a valuable aid when thoracoplasty is undertaken

To sum up, a satisfactory pneumothorax or a selective thoracoplasty is a method of relaxation collapse as a rule preferable to diaphragmatic paralysis In a very limited field, however, the latter may be of value At present and for some time to come, pneumoperitoneum must be regarded as under trial In many individual instances, it appears to have a place, if only for a time or for a special purpose, but as yet no final and discriminating assessment can be made of it Here also, because technique is easy but judgment difficult, it should be reserved to the experienced, or carried out under their constant guidance

Section of the scaleni muscles—anterior, medius and posterior—has been advocated as an addition to diaphragmatic paralysis, but the results hardly warrant the more extensive operation

EXTRAPLEURAL ARTIFICIAL PNEUMOTHORAX

The pros and cons of this operation need weighing carefully Its outstanding advantage is that it does not destroy the integrity of the chest, for there is no resulting external deformity, and secondly there is little or no paradoxical movement of the lung The former point is merely of aesthetic value, but even young females will readily agree to thoracoplasty and its attendant deformity if they are taken completely into the confidence of the medical adviser, and the whole situation is clearly explained to them

Paradoxical movement of the lung after thoracoplasty not only causes respiratory embarrassment, but also results in an abnormal degree of movement of the portion of lung which is the seat of disease, this in turn leads to a greatly increased flow of toxin laden lymph into the circulation—the main cause of the severe post operative reaction of the patient Moreover it conduces to aspiration of infected material into other areas of the lung for during inspiration the lung subject to paradox is deflated the opposite lung inflated, and secretions are readily sucked from the former into the latter It is this mainly which makes thoracoplasty the most serious of all the relaxation procedures

A further advantage of extrapleural artificial pneumothorax is that it is not so irreversible a method of relaxation as is thoracoplasty It has, however, serious disadvantages It is not applicable to all patients, and it carries with it a high incidence of complications

Indications

It is best suited to patients in whom (1) a satisfactory intrapleural artificial pneumothorax cannot be obtained, (2) the disease is recent (not more than of about 6 months' duration) (3) the disease is for all practical purposes unilateral, affects the apex solely, and is cavitated and (4) the cavity or cavities are not more than 2–3 centimetres in diameter and do not lie directly under the pleura

Complications

The complications are numerous During the operation, intractable cough perforation of the pleura as it is stripped from the chest wall and perforation of the lung into the cavity may all occur Troublesome haemorrhage into the extrapleural space is a common post operative incident Infection of the space by pyogenic

used, without sufficient appreciation of its disadvantages It may cause severe irritation of the pleura and a febrile reaction, and there is a real danger of rupture of the oil into the lung or through the chest wall Nowadays its limitations are recognized *It should never be used to improve an already ineffective pneumothorax* It may sometimes help to delay premature obliterative pleurisy which threatens to ruin an otherwise satisfactory pneumothorax *Its main value, however,* is to maintain the good of a successful pneumothorax in a patient who is compelled by circumstances to move to some place (for example, abroad) where air refills

thorax only in pneumothorax

Diaphragmatic Paralysis

Diaphragmatic paralysis, produced by temporary (crushing) or permanent (evulsion) interruption of the phrenic nerve, may appear a simple procedure, but it is not without its dangers Moreover, its very simplicity leads to abuse It may fail to bring about the closure of a cavity, yet give a false sense of security to the patient and maybe to his medical attendant It occasionally interferes with the expulsive power of coughing, and so with the defences of the lungs against infection If it fails to produce closure of cavities, and thoracoplasty becomes necessary, the risk of collapse of the base of the lung during the major operation is doubled or trebled Following crushing of the nerve for temporary paralysis, in some 3 per cent of

aerate such normal tissue as remains in the diseased lung

Indications

The patients submitted to this operation should therefore be chosen with great discrimination, and only when there is a solid expectation of a successful result The operation may be of value

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of this pull, cavity closure can be expected in about 90 per cent of patients

(3) For cavities in the lower lobe, both in the apical segments and in the basal segments Here, satisfactory results can be expected in only a small percentage,

The site of the cavitation, too, has a serious bearing upon the prospect of success Cavities in the upper lobes and in the apex of the lower lobes can be successfully treated by thoracoplasty, but cavities in the basal segments of the lower lobes offer [illegible]

is no other prospect of s[illegible]ccess[illegible]l treatment for them [illegible]

[illegible]

is a contra indication, for it is progressive even when the pulmonary lesion is con trolled In both these conditions, however, there is some reason to hope that streptomycin may control them sufficiently to make operation possible Intermittent diarrhoea, which probably but not necessarily indicates a mild degree of tuberculous enteritis, does not forbid operation if this can be done during a quiescent phase

Genito-urinary disease is not necessarily a contra indication Epididymitis in the male will often improve when the pulmonary lesion is controlled Overt renal tuberculosis should be assessed on its merits, if strictly unilateral and amenable to surgery it should not contra indicate thoracoplasty In a patient with diabetes mellitus arrest of the pulmonary lesion often leads to easier control of the diabetes Cardiovascular lesions must be carefully assessed as for any major surgical operation Age in itself does not contra indicate operation, it is the degenerative changes of age which are the controlling factors Under the age of 15 and over 50 thoracoplasty should be done only for compelling reasons, because of the degree of deformity which follows the operation in the young (though this has been overstressed) in the old because they are no longer young and the risks of operation are thereby heavier

Within strict limits, thoracoplasty may be justifiable in patients with bilateral infection The disease in the contralateral lung must be small in extent stabilized and never in the stage of exudative activity Sometimes a shallow pneumothorax will be advisable on this side, in order to make doubly sure that the lesion is con trolled satisfactorily Even bilateral thoracoplasty is occasionally feasible with an interval of at least 4 months between the operations

EXTERNAL DRAINAGE OF THE CAVITY

This may be undertaken either as an adjuvant to thoracoplasty, or as a definitive though temporary method of treatment As an adjuvant, drainage is established by a catheter introduced into the cavity after the method of Monaldi It is particularly suitable for large cavities of the distension type preferably without much surround ing infiltration In the experience of workers in Great Britain and in the United States of America actual closure of the cavity does not occur, this is to be expected as the draining bronchi are not affected by the decompression Nevertheless, the cavity becomes cleaner and shrinks in size, though this does not lessen the already estimated extent of the thoracoplasty to be done Cavity drainage however, may greatly improve the general condition of the patient It has the disadvantage of making a clean operation technically more difficult As a rule, this method must be

organisms is an index of faulty operative technique Tuberculous infection of the space may show itself about 3 months after the operation but it need be only a rare complication if the indications for the operation are strictly followed It is when the lung is seriously adherent to the chest wall receiving a blood supply from the intercostal vessels that the danger arises for during the stripping of the pleura section of these vessels deprives the underlying lung of its blood supply a quiet necrosis ensues and the disease breaks into the extrapleural space *via* a broncho extrapleural fistula

In view of all these dangers it might well be asked Who then is sufficient for all these things? Yet in certain hands and for certain carefully selected patients the operation has a place but once again the decision calls for the highest qualities of experience and judgment

THORACOPLASTY

The term thoracoplasty will be used to connote removal of portions of the ribs with apicolysis and the term lateral thoracoplasty to connote removal of portions of the ribs only Partial thoracoplasty indicates that a part of a varying number of ribs up to 7 have been resected

Indications

There is no easy way of determining the selection of cases for the operation A small number of patients are suitable for primary thoracoplasty—that is operation not preceded by an attempt to establish a pneumothorax The indications for this [illegible]
the disease

More often, however thoracoplasty is done after some other measure has been [illegible]

and work after the operation

The patient s resistance can be gauged by considering whether his disease is stabilized (a stable chronic patient) whether it is punctuated by periods of ex acerbation (relapsing chronic ') or whether he is slowly deteriorating (slipping chronic ') Retraction of part or of the whole of the hemithorax is a helpful piece of evidence for it is an index of fibrosis The ideal patient for thoracoplasty is the stable chronic The relapsing chronic is also suitable provided that the risks [illegible]

rightly those patients for whom operation is justifiable Furthermore it should always be borne in mind that the greater the extent of the disease the less the respiratory function is likely to be after operation It is idle to embark upon an operation so extensive as to leave the patient a respiratory cripple—a matter of outstanding importance if the disease is bilateral

and when diaphragmatic paralysis in conjunction with a pneumoperitoneum has failed, lung resection offers the sole chance of relief

Rupture of a cavity into the pleural space occurs most commonly after an *apparently successful division of adhesions, or before the adhesions have been* divided As a rule this is a lethal complication, and even if the patient survives there is a long period of illness with many operative interventions before the patient is once more stabilized In view of the serious outlook, resection of the lung together with the whole pleural sac, is not only justifiable, but is the procedure which holds out for the patient the best prospect of recovery

It is essential that the lung tissue to be left behind should be healthy, and therefore the most careful radiological, tomographic and bronchoscopic studies must be made before any decision to operate Streptomycin (½ gramme twice a day) is given parenterally for from 2 to 4 days before operation until 3 weeks following the last operative intervention, and 1 gramme is also left in the pleural cavity at the time of closure If it is impossible to separate the lobes through healthy tissue, then pneumonectomy rather than lobectomy must be carried out If so it is followed a few weeks later by thoracoplasty in order to prevent overdistension of the remaining lung On the same principle, diaphragmatic paralysis is carried out following lobectomy

SYMPTOMATIC TREATMENT

The treatment of pulmonary tuberculosis is not merely the treatment of local disease and of cavities, but is the management of a human individual whose world

stands He should be given hope, for much can now be done for him but he should not be buoyed up with false hopes He will need faith and courage, but these cannot be built on falsities, he must accept the fact that recovery is a long process

During the course of the disease there may be many distressing symptoms and complications which do harm and which need treatment Physical or mental, they interfere with the rest and relaxation which are the very basis of treatment

Cough

An ineffective cough should be checked (*see* page 369) often the patient can be taught to restrain it If there is much sputum, the bronchial tubes should be cleared at intervals, so that he can be at rest in between these periods The following mixture given in 2 ounces of hot water an hour before meals will help the patient to clear the tubes and to take his meal free from interference by heavy coughing

Sodium bicarbonate	10 gr	0 6 g
Sodium chloride	3 gr	0 2 g
Emulsio Chloroformi (*B P C*)	5 min	0 3 ml
Aqua Anisi Destillata (*B P C*), to	½ fl oz	15 ml

Laryngeal and Tracheal Irritation

Laryngeal or tracheal irritation accompanied by a useless cough and hardly any sputum may be due to nasal sinusitis or to smoking The first should be dealt with

regarded as a preliminary to thoracoplasty, its value being to change a bad surgical risk into a reasonable one

SPELIOTOMY

dition is poor, or because the site of the cavity demands too widespread a collapse of healthy lung by the appropriate thoracoplasty operation This may hold, for example, in dealing with cavities in the apical part of the lower and the pectoral segments of the upper lobes

LUNG RESECTION

Lung resection for pulmonary tuberculosis has been extensively used in the

Closed tuberculous lesions are most commonly submitted to resection on a tentative diagnosis of tuberculoma, or on a mistaken diagnosis of neoplasm Occasionally, however, a patient presents with a solid lesion and a positive sputum Here the lesion has become overt, the tendency is towards progression, other

factor in the successful result

Tuberculous broncho stenosis associated with upper lobe cavitation is satis-

cannot be controlled by any relaxation procedure In both these groups lung

calcium chloride (5 millilitres of a 5 per cent solution) will relieve not only the intractable diarrhoea, but also *the accompanying painful intestinal spasm*

Laryngeal Tuberculosis

Laryngeal tuberculosis is first revealed by hoarseness Later there is discomfort in the throat, pain on swallowing, and a consequent deterioration in nutrition Effective treatment of the pulmonary lesion is the foremost weapon against the laryngitis For the local laryngeal lesion, rest is essential, and the patient must not use his voice for many months (complete silence) Coughing and loud laughter are also harmful and should be restrained Smoking must be strictly forbidden In such cases streptomycin is *worthy of trial, for already there are reports of its value* in this condition

When discomfort is great and dysphagia severe, cocaine (in pastilles for sucking or as a 5 per cent spray in aqueous solution) is the most comforting drug It is best used before meals Given in the form of orthocaine powder, applied by means of a special insufflator, it may offer rather more lasting relief than a spray When the pain of swallowing is intense, it is *helpful* for the patient to lie prone on his bed with his head over the side, the liquid meal is placed in a cup about a foot below the bed level, and the patient sucks up the liquid through a long glass tube In desperate cases, the laryngologist may try coagulation by diathermy of the ulcerated areas or injection of alcohol into the superior laryngeal nerve Whether the local lesion is early or advanced, the help and guidance of a laryngologist are essential

Night Sweats

[illegible]

Pain

Pain is usually due to pleurisy, and some degree of it is so common that its treatment is primarily that of the underlying disease Nevertheless, it often calls for measures of relief Care must be exercised in giving morphine lest the cough reflex is abolished Strapping the side is apt to cause the patient discomfort or dyspnoea but kaolin poultices may be comforting (*see* also page 405)

Spontaneous Pneumothorax

At any time during the course of the disease spontaneous pneumothorax may occur either from rupture of a subpleural tuberculous focus or of a subpleural bulla consequent upon a fibrotic lesion or of an adhesion across the pleural space *of an artificial pneumothorax* It carries two special risks in pulmonary tuberculosis [illegible]

Pregnancy

Pregnancy in a woman with pulmonary tuberculosis, whether the condition is *active, quiescent or arrested* is a *disturbing complication* in that there is no unity

by the appropriate measures, the latter should be forbidden Sedative lozenges, a simple or a codeine linctus, and antiseptic inhalations may be helpful

BRONCHITIS

Associated bronchitis is treated along general lines (*see* page 366). The patient should be warned that "fresh air" does not involve suffering through widely open windows the cold damp rawness of atmosphere typical of so many days in our English winters

HAEMOPTYSIS

Haemoptysis (*see* also page 373) alarms the patient, but is not as a rule serious ... immediately fatal, and when one is, it is more

spread of the disease.

An important part of the after-treatment should be the ... anaemia Because it is a sign of activity of the disease, haemoptysis should always lead the doctor to a reassessment of the case, it may herald an extension or a reactivation of the lesion

... Tuberculous ... From

... content similar to that given ...

... the ulceration, and it should certainly ... cure, full doses of morphine ... the intravenous injection of

This will mean a period of at least 2 years, with clinical and radiological examination every 3 months It may be much longer This is not the place to discuss the wider, national aspects of rehabilitation, at present there is much wastage of human beings

There remains the problem of the patient who is a "therapeutic failure", partial or complete In some patients, the disease is incompletely controlled, yet they can still get about, and indeed are capable of some work in a sheltered occupation They are, however, quite unfit to withstand the strains and stresses of ordinary competitive life Only a tiny proportion of them can be got into institutions which fit the environment to the patient rather than allow him to take his chance with the environment. Most of them fight a losing battle, and at the same time are a source of infection and danger to family and to fellow workmen They must be instructed how to avoid spreading infection

The bedridden patient with advanced disease has to be made as comfortable as possible, equally important is the protection of others, and therefore it is probably wisest to separate him from intimate contact with his family by nursing him in hospital The provision of beds for such patients is comparatively small In most instances, family and doctor will have to do the best they can

ROBERT COOPE
C. PRICE THOMAS

PLEURISIES AND EMPYEMA

Inflammation of the parietal pleura may result from lesions of the thoracic cage (including the diaphragm and mediastinum), but in most instances it arises by contact infection from inflammation of the visceral pleura Inflammation of the visceral pleura arises in particular by extension of a pulmonary lesion Because of the extent of the pleural surface, a large amount of fluid may rapidly accumulate as the result of exudation or transudation into the pleural cavity

Thus, pleurisy may follow trauma, either mechanical (bruising or lacerating injuries), or chemical, for instance the haemoglobin of a haemothorax which acts as an irritating foreign body; or by infection carried in through the chest wall or spreading from the mediastinum, subdiaphragmatic area or lung

The initial response is congestion of the pleural membrane, which becomes [illegible] lymph is deposited on [illegible] surfaces [illegible] exudate [illegible]s at first sero fibrinous and straw-coloured, later it may become turbid from the presence of cells, or frankly purulent if there are large numbers of leucocytes Organisms responsible for the inflammation may be found in the fluid In certain instances it may be coloured by the presence of red blood corpuscles, or by altered haemoglobin

Thus, the initial stage of the inflammation is a "dry" or "plastic" pleurisy with no appreciable exudation of fluid The lesion may not pass beyond this stage On the other hand, it may progress to effusion, sero fibrinous or purulent, according to the severity or nature of the pleurisy There are therefore 3 main varieties of pleurisy "dry", with pain in the side and pleural friction, pleurisy with effusion and empyema

considerable time after

If the disease is merely quiescent but not stabilized, pregnancy should be avoided, [illegible]

the baby is not too dangerous a strain If abortion is to be carried out, it must be done within the first 3 months of the pregnancy, for after this period the operative trauma of terminating it has no advantage over letting the patient go to term.

If the disease is active (even if there is but a small exudative lesion) the outlook is unfavourable, the scales should not be weighted against recovery by the demands of pregnancy, and immediate termination of the pregnancy is advisable This is true even if it is possible to establish an effective therapeutic pneumothorax The same principles hold good in chronic but still active disease Unfortunately this whole problem is made more difficult because up to the time before which it is allowable to do therapeutic abortion (the fourteenth week), it is impossible to detect any specific deterioration, or (apart from general principles) to forecast what the effect of the continuance of pregnancy will be in a particular patient

In those patients who are allowed to go to term, it may be wise as a precautionary measure to establish a pneumoperitoneum immediately after delivery, and to maintain it for a few months

REHABILITATION AND AFTER-CARE

Treatment does not end with the discharge of the patient from a sanatorium, for the disease has such a leaven of malice and wickedness as to make the word "arrest" less misleading than the word "cure". The aim of rehabilitation is to restore the individual patient to as full a degree of health as is medically possible, to consolidate his recovery and tone him up after leaving the sanatorium, and to make him fit for work (yet work which does not endanger his health) and for economic independence Unfortunately, suitable light work is hard to find in the competitive labour market, and when found it is usually badly paid All too often an unideal compromise is all that can be achieved If possible he should go back to the work in which he has been trained, unless it involves heavy physical exertion, irregular

A piece of lint of suitable size to cover the hemithorax is made ready, and a spatula or carving knife to spread the kaolin is put into a jug of boiling water The lint is placed smooth side up on a table or spreading board, and when the kaolin is ready an adequate amount is turned on to the lint and spread rapidly, smoothly and as thinly as possible, the edges of the lint are turned in neatly, and the poultice is covered with a single layer of gauze and placed flat on a hot tray—if it is folded it will stick together Though the kaolin should be spread piping hot, the poultice must be carefully tested for heat by placing the back of the hand on it, in order to ensure that the patient's skin is not burnt As soon as it is of bearable heat, it is applied to the previously greased chest, covered *with a pad of wool, and bandaged in place with* a many-tailed bandage (Fig 11) The latter is to prevent the poultice coming away from the chest whenever the patient bends forward, with a resulting inrush of cold air and an eventual distressing clamminess The kaolin poultice need be removed only every 12 hours

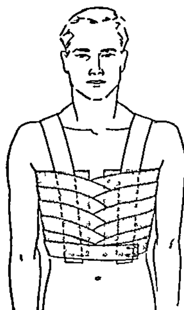


Fig 11—The poultice is shown by the stippling The tails of the bandage are criss-crossed each tail being firmly tucked into its corresponding axilla, and over lapped by the next

If these methods are not successful, fixation of the hemithorax by strips of surgical strapping may be tried Overlapping strips, 3 inches in width, should be applied along the direction of the ribs, from a point 2 inches beyond the spine on the sound side behind, to 4 inches beyond the middle line in front It is put on from below upwards, each strip being secured during full expiration Any hair on the chest likely to come in contact with the strapping should be first removed by shaving Strapping should not be used, however, unless it is really necessary and should not be left on once the pain has subsided The strapping may irritate a tender skin and there are occasional patients who find that it increases their dyspnoea and causes much local discomfort

[illegible] from the acute illness of a [illegible] primarily [illegible] is advisable, especially if the pleurisy is apparently "primary" (that is, not associated with any obvious pulmonary lesion, and therefore possibly tuberculous in origin) In any event, it is wise to have periodic skiagrams of the chest, to make sure that no insidious lesion is developing

PLEURISY WITH EFFUSION

Pleurisy with Serous Effusion

As in the case of dry pleurisy the treatment is conditioned by the underlying disease, but on the first approach to the problem it must be borne in mind that a frank pneumococcal infection which develops into an ordinary lobar pneumonia

FIBRINOUS PLEURISY ('DRY', "PLASTIC PLEURISY')

Dry pleurisy may result from trauma and bruising of the pleura, but in most instances it is the initial stage of inflammation of the visceral pleura which is involved by extension of a lesion in the underlying lung

It is, therefore, essential to form an opinion as to the nature of the primary disease for example, pneumonia, tuberculosis, lung abscess, infarct or neoplasm If the primary cause is a bacterial infection the treatment is with Sulphamezathine or Sulphamerazine or an antibiotic as indicated by the clinical aspect of the case Thus, a sudden onset with fever, perhaps a rigor, with tachypnoea, cough and slight cyanosis, may indicate the onset of pneumonia and this diagnosis may be made provisionally and treatment with Sulphamezathine prescribed before the [illegible]

aureomycin may come to be the selected antibiotic If the history of the case [illegible]

may, as already said, be due to carcinoma, either primary or secondary, and the immediate treatment will be symptomatic

Symptomatic Treatment

It is the stabbing pain in the side and the painful irritating cough which especially distress the patient Relief of these symptoms is imperative both for the patient s [illegible]

painful side of the thorax

If the pain is very severe, morphine $\frac{1}{4}$–$\frac{1}{3}$ grain, or Omnopon $\frac{1}{3}$ grain, should be given at once, and repeated if need be after a lapse of 4 hours in order to ensure rest and sleep It is not until the later stages of a disease such as pneumonia that

Syrup of Codeine Phosphate (*B P C*) Syrup of tolu Camphorated tincture of opium	equal parts

If the pain is only moderate, however, 10 grains of Dover's powder and 10 grains of aspirin may well be sufficient

[illegible]

allowed to boil gently for about 20 minutes, in order to heat the kaolin all through

PLEURISY WITH PURULENT EFFUSION (EMPYEMA)

The treatment depends in the first place on the treatment of the primary disease. As has been pointed out earlier, purulent effusions are secondary to infections which reach the pleura either from the lungs or elsewhere in the thorax, whether the infection is local or pyaemic In most instances, empyema is a *sequel to inflammation of the lung tissue*, in particular pneumococcal pneumonia, streptococcal broncho-pneumonia and tuberculosis Occasionally, infection reaches the pleura from a penetrating wound, or by *contiguity as in osteomyelitis of ribs or vertebrae* pericarditis and subdiaphragmatic abscess

Apart from tuberculous empyema and the other rarer infections mentioned, the *course of the illness usually takes one of two forms The patient suffering from* pneumococcal pneumonia recovers from the acute phase of his illness within a week, but then has a relapse, further pain in the side, a recrudescence of cough *once more a rise of temperature and a leucocytosis Though the pneumonic lung* is already resolving needling of the chest reveals thick, yellowish pus from a metapneumonic empyema, localized into a pleural abscess by adhesions On the other *hand, the streptococcal* broncho-pneumonia takes longer to subside *There is* widespread bronchiolitis and interstitial inflammation, and while active inflammation of the lung is still at its height, a synpneumonic empyema with thin, turbid purulent exudate develops, probably not localized but total, for pleural adhesions are few and tenuous at this stage

The localized metapneumonic empyema may be drained by open operation without seriously affecting the vital capacity To make an "open chest wound" in the presence of a synpneumonic empyema, however, may be fatal, for in the absence

patient's vital capacity—a patient, moreover who is still seriously ill, with ... pneumonic lesions in both lungs

It is clear then that open drainage of an empyema may be fatal if a patient is still very ill and the pus is not walled off by adhesions As the patient masters his infection, the accumulating thin serous inflammatory exudate ceases and the pus becomes thick and creamy The correct time to operate, therefore, is when the pneumonic process has subsided, the fluid has been limited by adhesions, and thick pus has formed

While the patient is very ill and inflammation in the lung is still intense, time can be gained by a series of aspirations of the fluid In many instances, the causal organism is penicillin sensitive, and penicillin will control the virulence of both pulmonary and pleural infection Indeed, the pleural cavity can frequently be completely sterilized by the introduction of penicillin following aspiration of the pus (for example, 250,000 units every other day in the highly toxaemic stage) Even so aspiration of the pus (or airtight intercostal drainage through a catheter) is usually not enough to bring about a satisfactory cure At the earliest safe moment, resection of a rib is advisable, in order to evacuate not only the pus but fibrin masses and sloughs in the cavity This avoids the formation of false membranes and adhesions which bind down the lung by scar tissue

The aim of treatment is to secure and maintain full expansion of the lung and

may be accompanied by an effusion which for the first few days is predominantly lymphocytic. On repeated examination of the fluid its cell content becomes polymorphonuclear, then frankly purulent, and at any stage in its development pneumococci may be found in film or on culture. The same indications for treatment as already outlined for dry pleurisy apply to the treatment of pleurisy with effusion, except that in the great majority of instances a serous or sero-fibrinous effusion which does not quickly develop into an empyema is tuberculous A small amount of fluid should in every instance be drawn off for diagnostic purposes, and submitted

if necessary for his relief, a moderate amount of fluid should be withdrawn as a safe-

safety. Otherwise the effusion should be left alone to be absorbed naturally and in its own time Pyrexia and toxaemia are the result of the underlying tuberculous

With tuberculous sero-fibrinous effusion, the important question is not what to do with the fluid, but how to deal with the active tuberculous disease—whether it consists of subpleural tubercles not seen on the x-ray film, or of an obvious tuber-

doctor should forget about the fluid for the moment, and consider whether the underlying tuberculous lung is one suitable for pneumothorax treatment Even so, he must not rush in to establish a replacement pneumothorax, for it is usually unwise to do so until the patient's condition is more stabilized

Occasionally, however, the effusion does not absorb even after many months Usually this means either that the pleural membranes are much thickened and that a low-grade but active inflammation still continues, or that enlarged tuberculous

clinical and x-ray control for at least 3 years It must never be forgotten that the patient with a tuberculous sero-fibrinous effusion is suffering from a serious manifestation of active tuberculous disease, and must be treated accordingly.

always danger of second [illegible]
larly if there is [illegible]
drainage or o[illegible]
would appear [illegible]
only if the patient is fit enough to undergo the operation

Enough has been said to show that right judgment on these matters may be of immense difficulty Moreover, a third alternative has recently been offered by Sarot (1949)—pneumonectomy with excision of the diseased pleural sac in instances of unilateral disease Already successes have been reported successes not merely of survival from the operation but of rapid improvement in the patient s general condition, relief of the toxaemia and subsidence of pyrexia

Sarot, I A (1949) *Thorax*, 4 173

PNEUMOCONIOSIS

SILICOSIS

This is by far the most important of the dust inhalation diseases The inhaled silica slowly dissolves in the tissue fluids, and being a protoplasmic poison causes either necrosis (rare) or a fibrotic reaction Eventually large areas of lung are filled with dense fibrous tissue in which shotty nodules are imprisoned normal areas of lung then undergo compensatory emphysema Tuberculosis is a frequent complication and it kills off many of these patients Others die of right heart failure or of an inter current acute respiratory infection

Asbestosis

Asbestosis is a particular form of silicosis, caused by certain complex silicates present in asbestos fibres It is liable to be rather more rapid in its onset and progress than silicosis but the symptoms, signs and complications are essentially the same

TREATMENT

Preventive Measures

Once the diagnosis of either of these conditions is made the first need is to remove the patient from further exposure to silica In more recent times great advances have been made in preventive measures against these diseases by (a) the provision of better ventilation where men have to work in a dusty atmosphere (b) sprays which lay the dust, (c) modification of the tools which create dust so that less dust is made and (d) the wearing of masks by men working in a dusty atmo sphere is possible in some occupations Another cardinal step in the prevention of this disease is periodic medical supervision of workers, including x ray films of the chest This is an important advance in preventive treatment because it may establish the presence of pneumoconiosis while it is still in subclinical form and it may lead to the discovery of complicating diseases of which the most common are pulmonary tuberculosis and bronchiectasis In the presence of any of these diseases the patient should not continue working in a dusty atmosphere This embargo should also be imposed on those who suffer from chronic catarrh of the respiratory tract

This object is obtained by adequate and

possible by Lipiodol pleurogram

of chronic empyema If a residual

the acute stage, or to the presence of a foreign body such as a swab or piece of drainage tube Such an empyema may be the cause of crippling illness or at least a state of chronic ill health and it may be the cause of bronchiectasis Therefore, whenever recovery is delayed in a patient who has had an infection of the

empyema must be borne in

cavity by decortication of the lung, by thoracoplasty, or by excision of the whole infected sac

Empyema in children

In infants, pneumococcal empyema is usually synpneumonic Moreover, in children under 3 years of age open drainage is far more lethal than in older patients Aspiration and closed drainage have therefore a large role Apart from these special considerations the essential principles of treatment are the same as in adults

Tuberculous empyema

This is the purulent stage of tuberculous pleurisy with effusion The infection may be

into the

lung and therefore obliteration of the pleural cavity; moreover, re-expansion is

crystals in the urinary tract is to ensure a *daily urinary output of at least 1½ litres* (2½ pints) In addition, sodium bicarbonate, 20 grains, is given with each dose of sulphonamide In most instances the temperature falls to normal within 48 hours of the initial dose, but the treatment is continued until there has been no pyrexia for 2 or 3 days It should be emphasized that dosage such as that described not only maintains an adequate content of the drug in the blood, but lessens the risk

in time, or because the organism is for some reason resistant to sulphonamides ("sulphonamide-fast") If sulphonamide therapy is going to succeed, there should already be an appreciable response by the end of 24 hours If there is no adequate response penicillin should be given.

such as diabetes mellitus, severe toxaemia or heavy pneumococcal bacteraemia), penicillin is preferable, sulphonamide can be given with penicillin, unless there is some contra indication (such as sulphonamide resistance, any complicating condition which may impair the urinary excretion of the drug, leucopenia or severe anaemia)

Whenever possible, penicillin-sensitivity tests should be made on the organism responsible for the infection, though this must not delay the institution of treatment *if clinical judgment supports its desirability* *Intermittent intramuscular injection* at 3-hourly intervals is, on balance, the method of choice, the initial dose being 30,000–60,000 units or more, according to the severity of the illness This should be followed by 25,000 units 3-hourly As the patient improves (usually there is subsidence of the pyrexia and toxaemia within 24–48 hours), he may be spared frequent injections by substituting 2 doses of 500,000 units each in 24 hours —for treatment must be continued for about 3 days after the temperature has become normal Alternatively one of the more recent preparations for prolonging the effective blood concentration may be used (*see* page 30)

COMPLICATIONS

If, in spite of the treatment of these pneumonias on the above lines, the illness progresses unfavourably, cyanosis and peripheral vascular failure are likely to be the outstanding manifestations of the anoxia and toxaemia Cyanosis calls for the

heart muscle helps to prevent myocardial damage and failure

If in the later stages of the disease the patient urgently needs sleep, and if oxygen and the simple sedatives already referred to (*see* page 413) are not sufficient to procure it, either 20 grains of chloral hydrate or 8 millilitres of paraldehyde by mouth (flavoured with syrup of orange) may be successful Tepid sponging may help If there is a distressing cough, it should be treated by a sedative linctus (*see* page 369).

REMEDIAL MEASURES

There is no cure for the pulmonary damage once it is established Bronchitis and emphysema are treated on the usual lines Any respiratory infection, however trivial it may appear, may endanger the patient, even with a simple cold he should stay indoors, preferably in bed, and be carefully nursed The onset of tuberculous [illegible]

THE PNEUMONIAS

INTRODUCTION

The main defences of the lung against inhaled pathogenic bacteria are the cough reflex and the muco-ciliary mechanism If these fail, the body responds by means of an inflammatory reaction in the bronchi, the bronchioles or the alveoli The defences may fail because what is inhaled overwhelms them by reason of the virulence of the infecting organisms or because of the constant dripping of pus from nasal sinuses, because the muco-ciliary defence has been destroyed or impaired by an acute influenzal or other serious upper respiratory tract infection, or by irritant gases, or because the cough mechanism has been abolished by prolonged anaesthesia, or by coma (for instance, in an epileptic fit or in apoplexy), or impaired by the pain of coughing after chest injuries or after abdominal operations

The two common groups of pneumonias are those caused by the pneumococcus, and those caused by other organisms In children especially, the pneumococcus [illegible]

the streptococcus Other notable invaders, though much less common, are *Haemophilus influenzae*, *Staphylococcus aureus*, and, rarely, Friedländer's bacillus.

A patient's resistance to pneumonic infection may be lessened by cold, exposure or fatigue, or by specific fevers such as measles or whooping-cough (here, upper respiratory infection is also a factor), or by alcoholism, diabetes mellitus, cardiac and renal disease or other debilitating illnesses.

whether lobar pneumonia or broncho pneumonia, must be given early and adequ doses of a sulphonamide If there is no response within 24 hours, or if it is cle

In broncho pneumonia the feeding of the patient is clearly more importa than in the short sharp attack of pure pneumococcus pneumonia, especially *many patients enter their illness with a nutritional handicap* Moreover, in weak children and in the old, digestion is easily upset To the fluids and diet alread described for pneumococcus pneumonia, more tempting and digestible food c. be added in the form of milk puddings vegetable soup made with milk gru syrup, tinned or bottled pears and their sweetened juices vegetable purées ar sherry whey Small amounts of food every 2 hours are, as a rule, more easily take than larger less frequent feeds The full amount of fluids must be taken, ar dehydration must be prevented, the measure of need being the dryness of the tongu the condition of the skin and, in infants, the degree of depression of the fontanell

spasm of the smaller bronchi associated with tenacio

alkaline drinks and

lp For children (an indeed for adults, if need be) moistening of the air by means of a steam tent helps t *loosen secretions and to prevent absorption collapse of the lungs* Care must b taken to avoid overheating inside the tent Changes of position, especially in ol people, may help to bring up the sputum Kaolin poultices have some effect i lessening bronchial spasm

STAPHYLOCOCCAL PNEUMONIA OF CHILDREN

Staphylococcal pneumonia is more often seen in newborn infants than in late childhood and it is a very serious disease with a high rate of mortality Th clinical picture may be *similar to that of pneumococcus pneumonia*, but i neonates it is usually ill defined and the physical signs minimal The disease i often complicated by empyema, whether synpneumonic or metapneumonic Lightwood (1950) advises treatment with penicillin and sulphamezathine for tw days, and subsequently with penicillin only For small infants the dose of penicillin given is 2000–5000 units per pound of body weight per 24 hours, according to

en 4 hourly to infants under 1 year

1947) advise

penicillin

VIRUS PNEUMONIAS

These diseases are highly contagious and call for strict isolation of the patient Treatment is symptomatic If secondary pyogenic infection takes place, the appro priate measures should be adopted

PRIMARY ATYPICAL PNEUMONIA

form, is

ifection

Digitalis is of no proved value in pneumonia, save when given for the possible complication of auricular fibrillation It should not be given as a routine Vene section is appropriate in the cyanotic patient only if there is congestive heart failure with engorged jugular veins and other characteristic signs an uncommon occurrence in pneumonia Peripheral circulatory failure results from anoxia toxaemia and dehydration It is easier to prevent by adequate early treatment directed against these factors than to overcome once it is established This is true also for the grave delirium which is an expression of the same factors In addition

glucose in normal saline solution (*see* page 538) If however, pulmonary oedema is present intravenous administration of fluid may be dangerous Complications such as pleurisy empyema and lung abscess are dealt with elsewhere

CONVALESCENCE

After a straightforward attack of pneumococcal pneumonia convalescence is usually rapid Unless there are signs of myocardial weakness the patient may be allowed out of bed, to sit in a chair for half an hour, a week after the illness is over, and then can be allowed up for a gradually increasing period each day In about 3 weeks he should be ready for convalescence in the country or at the seaside After broncho pneumonia, with its risk of permanent damage to the lungs if the attack has been severe and the illness prolonged convalescence may be slow The doctor must make sure that clinically and radiologically the lungs have fully recovered and for some considerable time after the illness he must watch the patient as care fully as he would watch a child who had acute rheumatism At least a month's convalescence is desirable

BRONCHO PNEUMONIA

more prolonged disease than is lobar pneumonia and is therefore more likely to wear out the patient It may lead to absorption collapse of lung segments with the resulting threat of future bronchiectasis A satisfactory response to sulphonamide therapy or to penicillin therapy is less constant than in lobar pneumonia One very important factor here is that severe infections by streptococci, staphylococci *H influenzae* or Friedlander s bacillus may produce a greater or less degree of [illegible]

greatly prolong the illness and [illegible]

The patient who is frightened or in pain should be given morphine sulphate ¼ grain (15 milligrams) by injection at once, and reassured As soon as possible it is wise to take x ray films, if need be with a portable apparatus, and also readings of the intrapleural pressures A closed pneumothorax shows a mean pressure which is negative (for example, — 10 to — 4 centimetres of water), an open pneumothorax a mean reading of zero (for example, — 2 to + 2), and a tension pneumothorax a progressively positive pressure (for example, — 2 to + 8 or + 4 to + 18, according to the tension)

Closed Pneumothorax

thorax calls for nothing more than rest in bed and the initial dose of morphine If the patient is seriously distressed, dyspnoeic and in pain, with a positive-pressure pneumothorax, enough air is removed to give clinical relief and to leave a slightly negative pressure This may be done by using the artificial pneumothorax apparatus in the reverse way In emergency, a large-bore needle should be inserted through the second intercostal space in front or through the fifth space in the axilla, until the air ceases to whistle out, it should then be attached to a pneumothorax apparatus, *and the mean intrapleural pressure reduced until it is just negative* Cardiac stimulants and oxygen may be necessary in addition, and should be given if the patient is at all collapsed or cyanotic

Tension Pneumothorax

Air may still continue to accumulate in the pleural cavity through a valvular ... If so, the needle or a trocar must ... to do so the ... nt

Open Pneumothorax

If the lung fails to re-expand, this is usually due to a persistent broncho-pleural fistula *The gradual and natural development of a scar may close it* If after some months the lung still does not expand, the case should be carefully re-assessed, preferably at a chest unit, for chronic pneumothorax is not common, indeed some patients with so called chronic pneumothorax are in reality suffering from a large congenital cyst of the lung If there is a small fistula, an obliterative pleurisy may be produced by introducing Gomenol (5 per cent) in liquid paraffin in a series of injections, beginning with 5 millilitres Silver nitrate is also used, though it causes a very painful pleural reaction

Complications

If the pneumothorax is complicated by an appreciable serous effusion, the condition is almost certainly tuberculous, and the treatment becomes essentially that of the underlying tuberculosis The problem of tuberculous effusions is dealt with

is difficult The areas of interstitial broncho pneumonia are generally not of sufficient extent to be diagnosed clinically, but they show clearly on an x-ray film

TREATMENT

In the past treatment has been (a) symptomatic and (b) remedial, in so far as the treatment of complications by Sulphamezathine and Sulphamerazine and antibiotics is indicated

Recently Aureomycin Hydrochloride has been found an effective remedy

siae of Q fever Aureomycin was given in capsules by mouth in a dosage of 30–50 milligrams per kilogram of body weight daily An initial dose of 100–250 milligrams hourly for 3 doses was followed by the same dose every 2 hours until the patient became afebrile, after this the dosage was reduced to 15–20 milligrams per kilogram, given in divided doses every 4–6 hours for 2–5 days These good results have been confirmed by other observers

Benward, J H (1947) *Lancet* 2 434

Lightwood R, and Bodian M (1950) *Penicillin* 2nd ed Ed by A Fleming 272 London Butterworth

Schoenbach, E B, and Bryer, M S (1949) *J Amer med Ass*, 139, 275

PNEUMOTHORAX

Most instances of spontaneous pneumothorax are the result of rupture of a sub-

pleural focus of infection (such as a staphylococcus pyaemic focus in children) As the air accumulates in the pleural cavity and the lung collapses, the edges of the tear may become pressed together, so obliterating the hole in the lung (*closed pneumothorax*) Occasionally, the hole is held open by an adhesion or by induration of the surrounding tissue, leaving a bronchopleural fistula and an *open pneumothorax* The most dangerous type of pneumothorax, however, is the *tension (or*

and great vessels and progressively embarrassing the venae cavae and right side of the heart The return of blood to the right side of the heart is thus interfered with, and the oxygenating power of the opposite lung (compressed by the displaced mediastinum) as well as of the collapsed lung is progressively diminished

TREATMENT

Whatever the cause of the pneumothorax, the immediate treatment depends on the severity of the initial symptoms The patient must be put to bed, and a half-

displacement of the mediastinum

TABLE I—(*continued*)

Lobe and area drained	Bronchi	Posture
Middle lobe (right) *Front, middle and lower parts of right lung*	Right middle bronchus	Lying flat on back, body quarter turned to left (that is, 45 degrees) maintained by a pillow under right side from shoulder to hip, foot of bed raised 12 inches
Lingula process (left) *Front, middle and lower parts of left lung*	Left middle bronchus	Lying flat on back, body quarter turned to right (that is 45 degrees) maintained by a pillow under left side from shoulder to hip foot of bed raised 12 inches
Lower lobe (a) Front part	Anterior basic	Lying flat on back, buttocks resting on a pillow, and knees bent, foot of bed raised 14 inches
(b) Apex lower lobe (upper posterior part)	Dorsal	Lying flat on face, pillow under lower abdomen
(c) Outer parts	Middle basic	Lying on opposite side, foot of bed raised 14 inches, pillow under patient just between hips and lower ribs
(d) Lower posterior area	Posterior basic	(a) Lying flat on face, foot of bed raised 18 inches or 14 inches plus pillows under hips for very ill patients (b) Tipping frame (of wood with a mattress over it) made like a wide inverted 'V', or the Nelson postural drainage bed. Angle of tip should be 45 degrees

Lying across bed face downwards, legs up to hips supported on the bed and body leaning down towards the ground at angle of 45 degrees. *The forearms rest on a folded rug or a pillow and the head is rested on the hands.* This position is not to be maintained for more than half an hour—starting with 10 minutes four times a day adding 5 minutes daily

TABLE II

POST-OPERATIVE DRAINAGE

Type of case	Posture
Thoracoplasty cases (with partial collapse of lower lobe on side of operation)	Patient turned on to sound side and lowered on to bed with only a small pillow, between hips and lower ribs, beneath him, and two pillows for his head, shoulders must rest on the bed. Foot of bed raised 12 inches
Lobectomy cases (for partial collapse of upper lobe with mucus, following lower lobe removal)	Patient turned on to sound side as above but no tipping of bed unless the lobe has dropped
Pneumonectomy cases	[illegible] of pneumonectomy [illegible] ards [illegible] ows

elsewhere (page 407) When the pneumothorax is complicated by a purulent effusion the treatment becomes that of an episode in some more general and serious disease

RECURRENT PNEUMOTHORAX

Repeated rupture of subpleural blebs, with resulting benign pneumothorax, is common It is possible to produce symphysis of the visceral and parietal pleural membranes, preferably by Gomenol in oil, and so to prevent recurrent attacks of pneumothorax

PENETRATING WOUNDS

Penetrating and open chest wounds may allow air to enter the pleural cavity Apart from the risks of septic infection, carried in by the missile, the gravest danger is the "sucking pneumothorax" This results from an open chest wound, with its critical inroads into the cardio-respiratory reserve owing to collapse of the lung on the injured side, displacement of the mediastinum, compression of the healthy lung, "mediastinal flutter", and to and fro movement of air between the "good" and the "bad" lung It is imperative to close an open wound of the chest as soon as possible—in emergency a pad covered in Vaseline may be used, to be followed by careful and meticulous surgical treatment.

ROBERT COOPE

POSTURAL DRAINAGE

Postural drainage is a highly specialized procedure, and for its conduct accurate diagnosis is required as to which lobe or lobes of the lung need drainage A specialist in diseases of the chest should give personal directions to the physiotherapist who is going to conduct treatment Specialized supervision is necessary The posture varies with the lobe or area to be drained, and these positions are set out hereunder Most of them are maintained either for one hour 2 or 3 times a day or for half an hour for 4–6 times a day

TABLE I

POSTURE ADOPTED FOR DRAINAGE OF SPECIFIC AREAS

Lobe and area drained	Bronchi	Posture
Upper lobe		
(a) Upper parts	Apical	Sitting upright with slight variations according to position of lesion slightly leaning backwards, forwards or sideways
(b) Front parts	Antero-lateral	Lying flat on back
(c) Right outer and posterior parts	Postero-lateral	Lying on left side horizontal, and then turned 45 degrees on to face resting against pillows to maintain position
(d) Left upper posterior part	Apico-posterior	Lying on right side and then turned 45 degrees on to face, with pillows arranged to lift shoulders 12 inches from bed

no leucocytosis There may be a history of exposure to a sick parrot, budgerigar or canary Proof of the disease is established by isolation of the virus from the blood or sputum in the acute stage, and demonstration of a notable increase in complement fixing bodies It is possible that many mild instances of the disease go un recognized, being regarded as influenzal colds

TREATMENT

Preventive

Prophylaxis would no doubt forbid anyone to make a pet of a budgerigar or a canary, and certainly no person should harbour a sick bird

Curative

Although the disease is caused by a virus, there is some evidence that it is susceptible to large doses of penicillin Tasker (1949) reported a case in which 1,200 000 units, divided into three doses, were given seven days after the onset of illness, *and after this, 1,500,000 units divided into two doses, and subsequently 1,000,000* units twice daily up to a total dose of 11,700,000 units The patient's temperature was normal 72 hours after penicillin treatment was begun

At the present time it is advised to give penicillin, 100 000 units 3 hourly, but if further experience proves that Chloromycetin and aureomycin are equally effective, they will of course replace penicillin

PULMONARY CYSTS

HYDATID CYSTS

As might be expected in view of the flow of the portal blood stream through the *liver towards the right auricle, the lungs are the second commonest site for the* development of hydatid cysts There the cysts remain latent until they produce symptoms dependent on their site and their size Thus they may cause pleural pain, or cough, or pressure on a bronchus, or rupture into a bronchus The cyst may become secondarily infected Rupture may occur into the pleural cavity, *with* a serious anaphylactic reaction

The risk of anaphylaxis forbids the putting of a needle into the chest and the withdrawal of fluid for diagnostic purposes, for the cyst fluid may escape into the tissues along the track of the needle A similar danger has to be guarded against during the course of surgical removal of a hydatid cyst

TREATMENT

Hydatid cysts of the lung are amenable to surgery, and should be removed, *once* they are diagnosed, as early as possible Sometimes expectant treatment has to be [illegible] "poor surgical risk", or because at thoracot [illegible] unduly hazardous such [illegible] ne of the complications already described may place the patient in danger of a serious illness or even of death

CONGENITAL PULMONARY AIR CYSTS

These cysts are probably of bronchial origin, and may be in communication with bronchi or not They may be solitary or multiple, unilateral or bilateral They must

PHYSICAL TREATMENT FOR SURGICAL CHEST CASES

The following outlines of physical treatment are given for surgical chest cases.

PRE-OPERATIVE TREATMENT

post-operative catarrh

Bronchiectasis (in preparation for lobectomy or pneumonectomy)

by clapping and by vibrations during prolonged expirations over the affected areas. For anterior parts of the chest, such as middle lobe and lingula, vibrations only are given

POST-OPERATIVE TREATMENT

Post operative treatment must be carried out under the direction of the surgeon, and the reader is referred to text-books on surgical treatment

(I am indebted to Brompton Hospital for permission to quote from their literature and to Miss Jocelyn M W Reed, physiotherapist in charge of the department, who compiled these directions)

GEOFFREY EVANS

PSITTACOSIS (ORNITHOSIS)

Psittacosis is a virus disease which especially attacks members of the parrot family, though it may be found among other birds and animals Inhalation of dried bird droppings constitutes the principal mode of transmission to human beings. The virus is highly infectious for man and there is now evidence of human-to-human transfer The illness takes the form of an unusual type of pneumonia or influenza, with a slow pulse (enteric fever may be suspected), intense headache and

half-weekly intervals until it reaches 20 grains 3 times a day; it is then given in large doses, 4 times a day, *up to 120 grains daily*, and this may be continued for several months To prevent recurrence of the infection the drug is given for 2 months after clinical recovery There is no advantage in giving iodine intravenously

PULMONARY OEDEMA

Engorgement of the lungs with blood and tissue fluid renders them more rigid, intensifies the Hering Breuer reflex, and leads to rapid shallow breathing and a reduced vital capacity Furthermore, the blood and oedematous exudate distend the alveolar walls, escape into the alveolar spaces, and interfere seriously with the normal exchange of gases Hence the development of anoxia with its usual manifestation of cyanosis *The expectoration is profuse and frothy, and may be stained* pink with blood It is typically non purulent

Tissue oedema and transudates result from a disproportion between the rates of inflow and outflow between the capillaries and the tissue spaces by reason of (a) an increase of hydrostatic pressure in the capillaries, (b) injury to the capillary walls resulting in increased permeability; or (c) alterations of osmotic pressure on one side or the other of the capillary endothelium Pulmonary oedema may thus be caused by left ventricular failure, with its clinical manifestations of various degrees of "cardiac asthma', from paroxysmal cardiac dyspnoea to acute pulmonary oedema, by severe mitral stenosis, by acute pulmonary infection (as in fulminating influenza) or irritation (as by irritant toxic gases), and by excessive blood volume such as may be produced by the administration of too great a quantity of fluid intravenously, especially in the presence of acute renal failure or of severe shock

Treatment

The principles of treatment are therefore (i) to combat the primary disease, (ii) to relieve the circulation by venesection (½–1 pint of blood rapidly withdrawn) if there is gross pulmonary engorgement with cyanosis, (iii) to give oxygen in high concentration, in order to overcome the disadvantage of the oedematous barrier to gas exchange in the alveoli, and (iv) to help to dehydrate the lungs by giving a mercurial diuretic, if the oedema persists and provided that there is no renal disease.

If the patient is apprehensive or in pain (for example, from a cardiac infarct) morphine may be given provided that the respiratory centre is not poisoned by [illegible] In the acute stage of paroxysmal cardiac dyspnoea [illegible] should be given intravenously (for ex [illegible] an illogical drug to use in pulmonary oedema

After a severe attack, the patient should be kept in bed for at least 3 weeks in order to repair his damaged cardiac reserve, and thereafter should live a life suitable to his general condition and, in particular, to the state of his myocardium

ROBERT COOPE

be differentiated from true cystic bronchiectasis (to be treated as such), and from the multiple tiny spaces of the 'honeycomb lung" associated with the lipoidoses and other comparatively rare conditions

follows, and persists

Treatment

The proper treatment is to excise the cyst, a matter which involves difficult problems of surgical and anaesthetic technique Many congenital cysts become secondarily infected sooner or later The ideal, therefore, is to excise them before they do become infected This, however, may involve lobectomy or even total *pneumonectomy* and the patient, usually a child, should be meticulously assessed at a chest surgical unit before operation is undertaken For an infected cyst, excision is again the treatment of choice, under the control of penicillin, here also the problems involved may be difficult especially if there are cysts in both lungs

PULMONARY MYCOSES

There are many varieties of organism which may cause pulmonary mycoses

America true fungus infection of the lungs is rare Organisms such as monilia or aspergillus are only potentially pathogenic, the former can often be found on mucous membranes in the absence of any pathological lesion whatever, the latter, too, may behave as saprophytes

tea tasters in Ceylon, the more severe pulmonary type may simulate broncho-pneumonia or pulmonary tuberculosis

TREATMENT

For these and other mycotic infections of the lungs, *potassium iodide is given in* large doses An idiosyncrasy to this drug is uncommon, nevertheless the dose for the first 3 or 4 days should be only 5 grains given with water 3 times daily after food If this is tolerated the dose of potassium iodide is steadily increased at

should also be given a suitable iron mixture from about the end of the first month of life, or a milk preparation fortified with iron may be given It is wise to give iron in small doses initially in case intestinal disturbance should result

(1) Mistura Ferri et Ammonii Citratis pro Infantibus (N F)
(For an infant aged 3 6 months 30 minims would be given 3 times a day, and at one year old 60 minims 3 times a day)

(2)		
Ferrous sulphate	1½ gr	0 1 g
Dilute hypophosphorous acid	¼ min	0 015 ml
Dextrose	15 gr	1 g
Chloroform water to	60 min	4 ml

(For an infant of 3-6 months 30 minims would be given 3 times a day for prophylaxis)

(3)		
Saccharated iron carbonate	5 gr	0 3 g
Compound powder of tragacanth	2 gr	0 12 g
Chloroform water to	60 min	4 ml

(30 minims for an infant of 6 months)

Ferrodic is a palatable chocolate-coated granule preparation suitable for older infants and children, the dose is one teaspoonful of the granules after meals or added to milk Another preparation useful for older children is Colliron 5 minims three times a day taken with a little milk

Examples of dried milks containing added iron are Ferrolac, a full-cream dried milk containing added vitamin D and 1,000 parts of iron per million, and Hemolac a full-cream dried milk containing 31½ grains of iron and ammonium citrate per pound

Remedial treatment

When an anaemia of hypochromic and microcytic type is found in an infant or child, inquiries should be made to ascertain possible causes for iron-deficiency infections should be looked for and treated, and when the cause remains obscure occult loss of blood should be considered The state of iron deficiency is treated with the remedies mentioned under preventive treatment but given in somewhat larger

fusion, but those which result from a mixture of infection and iron deficiency may greatly benefit if blood is given In severe cases blood transfusion hastens recovery and obviates an unduly long stay in hospital

OTHER DYSHAEMOPOIETIC ANAEMIAS

The majority of the dyshaemopoietic anaemias are hypochromic and microcytic and respond when iron is administered but a few cases show reduction in the number of red cells without significant alteration in the average size of the cells or their haemoglobin content (orthochromic anaemia) Infection may be the cause of this but often the causation and haematology are complex The treatment is to remove primary and contributory causes and to administer iron

MACROCYTIC ANAEMIA

At birth there is normally a high proportion of large cells (macrocytosis) and these disappear, rapidly at first and then more gradually during the first year Non

CHILDREN'S DISEASES

ANAEMIA IN INFANCY

DEFINITION AND CAUSATION

Pallor does not necessarily mean anaemia for it may be associated with an infant's colouring and complexion, or due to illness and confinement indoors or merely to fatigue, and some infants are noticeably pallid when asleep Anaemia, then, needs to be strictly defined as a numerical deficiency of red corpuscles or a quantitative reduction of haemoglobin below normal levels Anaemia, too, has many causes and it is better not to embark on the treatment of an anaemic state until the probable cause has been considered Indeed, the secret of success is to

anaemias due to destruction of red blood cells more quickly than they can be produced, (3) haemorrhagic anaemias due to bleeding from various causes, and (4) primary aplastic anaemias due to disease of the bone marrow

DYSHAEMOPOIETIC ANAEMIA

Iron-deficiency Anaemia

In infancy especially, but also in later childhood, iron deficiency anaemia is the commonest type of this, the so-called nutritional anaemia of infancy The predisposing factors are prematurity, twin gestation, severe iron-deficiency in the

under 6 months of age an anaemia is unlikely to be due to nutritional causes alone. Simple iron-deficiency anaemia is microcytic and hypochromic in type with a low

Preventive treatment

Bacterial toxins and haemolytic poisons may also extend their destructive activity beyond the circulating erythrocytes to the bone marrow The process may be due to a known infection, such as infantile syphilis, or the cause may be unknown Treatment will depend upon recognizing infections and deficiencies If infection is present, leucocytosis will be found, if iron deficiency develops, the mean cell haemoglobin concentration is lowered The prognosis depends upon the causation the age of the patient, and response to treatment Often transfusion is the initial remedy Iron will be given for iron deficiency, and chemotherapy or antibiotics when infection is present

CONGENITAL HAEMOLYTIC ANAEMIA FAMILIAL ACHOLURIC JAUNDICE

This condition is dealt with under the heading of Anaemia on page 80

ANAEMIA ASSOCIATED WITH HAEMORRHAGE AND PURPURA

POST-HAEMORRHAGIC ANAEMIA

When considerable bleeding takes place in a child who is otherwise healthy, post haemorrhagic anaemia ensues The bleeding may be the result of an accident, or an operation such as removal of tonsils and adenoids, but bleeding can also be caused by infections (such as epistaxis in influenza, tonsillitis, nasopharyngeal diphtheria, or intestinal haemorrhage as in typhoid) or a local gastro intestinal condition may be responsible (such as diaphragmatic hernia or ulceration of a Meckel's diverticulum) Haemophilia and the several clinical varieties of purpura are other occasional causes

Remedial treatment

The first action required is to check the bleeding This may mean packing the nose, tying a bleeding vessel in the fauces after tonsillectomy, applying Russell's viper venom in haemophilia when the site of bleeding is accessible or giving a blood transfusion when it is not Having taken such immediate steps the next thing is to deal with the infection or the other cause of the bleeding If the bleeding has been severe the patient may need a blood transfusion, otherwise an iron preparation will be given in sufficient dose and for a sufficient length of time, that is, not usually less than for one month

HAEMORRHAGIC DISEASE OF THE NEWBORN

Definition

[illegible] the

some degree of tissue damage, may be classified as (1) intracranial haemorrhage (2) gastro intestinal haemorrhage (melaena neonatorum), or (3) spontaneous external haemorrhage, for instance, from the umbilicus

Aetiology

The level of prothrombin in the plasma tends to be low in the first week of life often about 25 per cent, sometimes as low as 10 per cent, of the normal adult level, but the explanation cannot lie wholly in this fact because prothrombin values

recognition of this has been responsible for the description of some infantile anaemias as macrocytic Macrocytic anaemia has been reported in syphilis, gastro-intestinal diseases and diphyllobothrium infection In coeliac disease the anaemia is almost always hypochromic and responds when iron is given, but macrocytic anaemia has also been described just as in adult coeliac disease, mixed microcytic and macrocytic anaemia in coeliac disease would suggest a double deficiency (iron and folic acid) Yeast extract and liver extract can be used for macrocytic anaemia in coeliac disease True pernicious anaemia does not occur in childhood

HAEMOLYTIC ANAEMIAS

Haemolytic Disease of the Foetus and Newborn Erythroblastosis Foetalis

Haemolytic disease of the foetus and newborn is dealt with on page 459

Acute Haemolytic Anaemia (Lederer's Anaemia)

This condition comes on abruptly with an acute febrile illness of unknown aetiology; jaundice and haemoglobinaemia are usually present

Somewhat similar acute and subacute haemolytic anaemias may arise from *septicaemia, malaria, sulphonamide drugs, lead poisoning, Benzedrine, pheno-thiazine* and favism

Remedial treatment

The haemolytic phase, although dangerous and perhaps fatal, is of relatively short duration and blood transfusion by replacing the destroyed cells tides the patient over the crisis If relapses occur splenectomy has to be considered

Mixed Dyshaemopoietic and Haemolytic Anaemia von Jaksch's Anaemia, Erythronoclastic Anaemia of Infancy and Childhood

In infancy and early childhood there are forms of anaemia with their causes mixed or partly unknown and their classification difficult For example, anaemic infants with enlargement of the spleen and evidence of very active regeneration in the blood formerly went under the title of von Jaksch s anaemia but the variations

Infantile erythronoclastic anaemia

This term has been suggested to indicate a disease process which falls on the bone marrow as well as on the circulating blood In certain newborn infants especially in premature ones, after and in spite of the usual neonatal haemolysis, medullary haemopoiesis may be more or less severely inhibited, signs of regenera-*tion being absent either for a few days or weeks, or permanently;* with temporary

a diagnosis of congenital aplastic anaemia or congenital hypoplastic anaemia (according to degree) has to be made The treatment of these conditions consists in repeated blood transfusions followed for an indefinite period (Diamond, 1946)

character of melaena until the next day If a favourable result is not obtained the vitamin K should be repeated in 2 hours and preparations made at once for a blood transfusion Blood transfusion is the method of choice in any infant when bleeding has been severe enough to cause anaemia

In the past it was customary to treat these patients by means of intramuscular injection of adult whole blood, a method usually highly effective If, in an emergency, this is done it is important to use blood which is rhesus negative, particularly in *the case of a female infant because of the danger of sensitizing the recipient*

Umbilical bleeding—If this takes place immediately after the cord is tied or within a few hours, it is due to an insecure ligature and the treatment is to re tie the cord Cases of severe haemorrhage requiring blood transfusion have occurred through failure to recognize what has happened If the cord ruptures at its base, it may be secured by a mattress suture and pad

Bleeding from the umbilical cord from 24 to 72 hours after birth is likely to be a *manifestation of haemorrhagic disease of the newborn, and will then be treated* as for melaena neonatorum Alternatively, it may be a manifestation of icterus gravis neonatorum, umbilical sepsis, or occasionally congenital syphilis

PRIMARY APLASTIC ANAEMIAS DUE TO DISEASE OF THE BONE MARROW

Idiopathic Aplastic Anaemia

In the first place it is important to confirm this diagnosis because of the conditions with which it may be confused, including leukaemia and thrombocytopenic purpura, and for this purpose after accurate examination of the blood a careful marrow biopsy will be required Extreme degrees of the condition, showing grave anaemia and a marked tendency to bleed, are fortunately rare because there is no curative treatment and the patients can only be kept going by repeated transfusions in young children a long series of transfusions sooner or later leads to difficulty when all the *available superficial veins have been used up, for it is no easy matter* to use a vein and also to keep it intact for a subsequent transfusion In treating these cases attempts will be made to stimulate the bone marrow by means of liver, iron and folic acid, but they will be disappointing Splenectomy confers a limited amount of benefit, but only by diminishing the rate at which effete erythrocytes are destroyed, and it is not curative Successful grafting of bone marrow has been claimed as a logical treatment

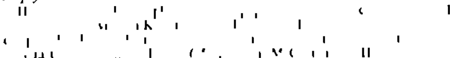
[illegible] best
who
[illegible]sion
is likely to be required It is better to give small transfusions at shorter intervals
[illegible]
ur-
uld

Hypoplastic Anaemia

This probably represents a similar though less severe form of disturbance than aplastic anaemia Varying degrees of hypoplasia occur and the condition is more

even as low as 5 per cent have been found without haemorrhage It may be that there are other influences such as interference with the vessel walls by anoxia impaired contractility of capillaries and so on or even a factor which prevents the conversion of prothrombin into thrombin Nevertheless a definite type of prothrombin curve is recognized as characteristic of this age period a low value at birth which falls still lower from the second to the fifth day and there after rises quickly to a stabilized normal value. This phase of physiolog cal hypo prothrombinaemia is the danger period for haemorrhage in the newborn

Prophylaxis



Unless th s has been done for the mother it is probably a wise practice and cer tainly a safe one to admin ster an aqueous solution of vitamin K to all newborn babies as soon as possible after delivery and this indication is strengthened in cases of difficult labour cyanos s of the newborn and prematurity

Dose —The dose recommended for the mother is 25 milligrams of menaphthone intramuscularly or 50 mill grams of acetomenaphthone by mouth It is stated to be effective when given not later than 4 hours before del very Kapilon liquid 5 millilitres contains 50 milligrams of menaphthone Synkavit 5 tablets contain 50 mill grams of menaphthone both the above and Kayvisyn are also available in aqueous solution for intramuscular inject on

The dose recommended for the infant is 5–10 milligrams of menaphthone An aqueous never an oily solution should be used for intramuscular injection because severe sloughing of the gluteal reg on has occurred from the latter Suitable prepara tions are Kap lon Kayvisyn and Synkavit dispensed in ampoules For oral use there is also Kapilon l quid (18 minims that is 36 drops delivered by the dropper supplied) and Synkavit tablets

Remed al treatment

When neonatal bleeding is recognized its treatment depends on its site and severity

Intracranial haemorrhage —This is treated by giving vitamin K and by general measures The infant s head should be raised after he has had his air passages cleared and he will probably be nursed in an oxygen tent Sedatives may be required for irritability or convulsions The outlook is poor and it is probable that most instances of macroscopical haemorrhage are fatal so the importance of prevention is obvious

Melaena neonatorum —The first s gn of this may be a little dark brown staining of the vomit Many cases are m ld and recover spontaneously but a few develop into serious emergencies so that prompt recognition and immediate treatment are

steady within an hour of successful treatment although the stools may show the

ASPHYXIA AND ATELECTASIS IN THE NEWBORN

CAUSATION

Asphyxia means that respiration fails to be established atelectasis is incomplete aeration of the lungs Atelectasis follows from asphyxia and is inseparable from it so that the causes of asphyxia are also those of atelectasis Since the lungs do not expand all at once patches of atelectasis are normally present for a day or two after birth, and the time before expansion is complete depends on the vitality of the infant

Asphyxia is produced either when the respiratory efforts themselves are ineffectual, or when the brain centres that should initiate and control these efforts are unable to do so Some examples in the first group are mechanical obstruction of the airway as by inhaled material from the birth passages, weakness of the muscles of respiration or undue softness of the thoracic cage, and rarely congenital deformity within the thorax which will not allow of proper expansion of the lungs Coming in the second group depression of the respiratory centre may result from certain [illegible]

damage and cerebral oedema that occurs occasionally from a traumatic delivery

CLINICAL PICTURE

Asphyxia is recognized by the infant breathing shallowly, irregularly, or not at all, and by the colour which becomes blue in the milder cases, or white with a cyanotic tinge if the baby is gravely shocked

TREATMENT

Preventive Measures

These consist of skilful midwifery, skilful anaesthesia, and prompt and skilful resuscitation

Remedial Treatment

Asphyxia neonatorum is to be expected with premature or multiple births and after long and difficult labours Preparations to revive an asphyxiated infant should *be made beforehand During labour, maternal sedation* with morphine scopolamine and barbiturates must be cautiously regulated and anaesthetics should be given with due skill so that asphyxia in the mother is avoided and labour not unduly prolonged When the baby is born the air passages should be immediately cleared of secretion with a finger wrapped in gauze and the head of the child should be lowered for drainage of the air passages *If the infant does not then begin to breathe* suction must be applied to the back of the tongue and pharynx with a non metal mucus catheter, or better with an electric suction pump If respiration still does not start $\frac{1}{20}$ grain *of lobeline hydrochloride can be injected into the umbilical vein* and milked upwards along the cord into the infant s circulation If there is still no attempt at breathing some form of artificial respiration is demanded The following *methods can be used*

common than complete aplasia The condition may be secondary to some noxious and toxic agent, though it is usually difficult to establish the causation, but certain cases have been traced to exogenous poisons such as benzol, arsenobenzine and the sulphonamides Proof of the causal relationship of endogenous toxins such as those of severe infection is even more difficult to obtain since the infection may be the result of the blood state The secondary aplasias such as those caused by over-exposure to radium and x rays, to reticulosis and malignant disease such as sympatheticoblastoma, can be demonstrated pathologically The clinical diagnosis of hypoplastic anaemia may require confirmation by biopsy of the bone marrow

Treatment

If there is any hint as to the causation, for example, exposure to radiation or a drug great care should be taken to avoid this in future There are certain relatively mild cases in which a balance is struck, at a level consistent with an active existence, between the formation of red cells and their destruction For example, a child with 3 million erythrocytes and 60 per cent of haemoglobin will probably be able to go to school and take part in most activities, and as there is no specific curative treatment the physician can do no more than attend to the general health, seeing that the patient is not required to attempt more than is within his reserve Strenuous exercise must be avoided as well as residence at a high altitude, and air-travel may not be advisable More severe cases will be treated in the same way as congenital hypoplastic anaemia

CONGENITAL HYPOPLASTIC ANAEMIA

This condition shows itself at birth or within the first 3 months, and it involves the erythropoietic function of the bone marrow without producing a reduction of thrombocytes or a tendency to bleeding, but there may be a moderate leucopenia In certain cases a biopsy of the bone marrow will demonstrate partial hypoplasia of the red cell elements There may be enlargement of the liver These patients will remain in good health and gain weight remarkably well provided that transfusions are given at regular short intervals Patients reported by Diamond and Blackfan (1938) had to be transfused at intervals of 6–10 weeks There is no familial incidence They reported that a few of their patients showed spontaneous recovery, but the majority went on only with the aid of regular transfusions and were not benefited by splenectomy when this measure was tried When so many transfusions have been

REGINALD LIGHTWOOD

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FACIAL PALSY

Usually, facial palsy results from pressure on the seventh cranial nerve by a forceps blade during delivery Ordinarily it clears up within 1–3 weeks of birth The only immediate treatment needed in severe cases is to protect the eye on the affected side by instilling castor oil drops once or twice daily If the paralysis shows no signs of clearing up after 6 weeks (and this is rare) surgery should be considered

BRACHIAL PLEXUS INJURY

Brachial plexus injury results during delivery usually from traction on the head without freeing the shoulders The commoner clinical type involves the upper roots of the plexus (C 5 and C 6) and the paralysed muscles are the abductors and external rotators of the shoulder, and the supinators of the elbow The prognosis is good but recovery takes some months, occasionally no improvement occurs without recourse to open operation Treatment consists in relaxing the affected muscle groups, this is achieved, with the infant in its cot or pram, by tying the affected arm with a clove hitch to the top of the bed When old enough to sit up an aeroplane splint is worn until function returns The paralysed limb should be put through the full range of passive movements daily

FRACTURE OF BONES

Skull Bones

Fractures of skull bones are unusual They may be subdivided as follows

(1) *Depressed fractures*

... without complete loss of con

... s alone, *occasionally they* have to be elevated

(2) *Linear, stellate and comminuted fractures*

Loss of continuity of bone occurs and there may be subdural haemorrhage as well as cephalhaematoma Sometimes linear fracture causes no intracranial damage but usually stellate and comminuted fractures cause intracranial damage

Treatment —The treatment is for shock and cerebral oedema (*see* also *Subdural* Haematoma in Infancy, page 505)

Clavicle and Long Bones

... heals in good position without treat ... , may also be broken ... required is to secure the affected limb by means of a bandage

INTRACRANIAL INJURY

Intracranial injury is responsible for about 24 per cent of stillbirths and 28 per cent of neonatal deaths (MacGregor, 1946) Slight subdural or subarachnoid bleeding can be survived but severer bleeding is nearly always fatal Clinical

(1) Passing an intratracheal tube and insufflating the lungs with 5 per cent

be interposed

If respiration is occurring but is feeble and the baby's colour is bad the correct treatment is as follows

The baby should be placed on its side in a warm cot with its head lowered,

harm rather than good

BIRTH INJURIES

(*See also* Subdural Haematoma)

It is perhaps remarkable, when birth is such a severe experience and the infant

number of fatalities in road accidents (all ages) in England and Wales (Ministry of Health, 1949)

CEPHALHAEMATOMA

This is a subperiosteal extravasation of blood in the scalp, and is usually single but may be multiple Prevention depends on careful delivery of the foetal head, and on the administration to the mother of vitamin K (25 milligrams intramuscularly) before delivery The haematoma is usually parietal and develops slowly It requires no treatment, for the effusion gradually disappears in a few weeks without residua Aspiration is contra-indicated as the haematoma may then re-collect or become infected

STERNOMASTOID HAEMATOMA

several months The exercise consists of bending the baby's head laterally towards

BRONCHITIS: TRACHEOBRONCHITIS

In most cases bronchitis is a relatively benign condition, but in infants as well as in debilitated children, it may be serious and even fatal

AETIOLOGY

A healthy child may develop bronchitis after contact with a virulent infection,

have been made too fat by over-much carbohydrate, perhaps lacking in vitamins as well, allergic conditions of the respiratory tract; diseases such as congenital morbus cordis, bronchiectasis, and fibrocystic disease of the pancreas, and it is particularly in recurring cases that we should look for such predisposing causes The more immediate causes are chiefly the virus infections—coryza, influenza, measles and others—but also bacterial ones, such as pertussis, also infections due to pneumococci, streptococci, staphylococci and Pfeiffer's bacillus, and one or other of these are often superimposed upon a virus infection

TREATMENT

PROPHYLACTIC

See under general preventive treatment of upper respiratory infection, page 522

REMEDIAL

General

patient at the foot of the bed moistens the air and lessens the cough When there is catarrh of the nasal passages and stuffiness of the nose interfering with the child's breathing, an ephedrine spray may be used, such as Nebula Ephedrinae Aquosa

attack,
is much
the last
le tradi-

tional emetic was commonly given and was beneficial since, through vomiting, a child rids itself of a good deal of "phlegm" which otherwise is apt to embarrass the breathing

Medicinal

Expectorants have a strictly limited place in the treatment of children and should certainly not be used as a routine A warning should also be given against atropine

TREATMENT

Preventive

Intracranial haemorrhage is particularly associated with excessive moulding in premature, obstructed, prolonged or instrumental deliveries, and especially with first deliveries Antenatal care to foresee and correct maternal causes of dystocia is therefore all-important The prevention of prematurity is one of the greatest of obstetric problems It is known that improvement in social conditions is one important factor in reducing its incidence, and so in any individual case every effort

Kapilon, Kayvisyn, or Synkavit.

Remedial

A baby born with intracranial trauma presents usually as an example of neonatal asphyxia (*see* page 432) and with more or less shock After the routine pro-

infant is comatose, a lumbar puncture may be performed with the aim of reducing intracranial pressure, but apart from these indications it is not advised Lumbar puncture may be preceded by a trial of rectal hypertonic saline (1–2 ounces of a 10 per cent solution, 4-hourly) If there is considerable restlessness or if convulsions occur, chloral hydrate, 1–2 grains should be given hourly until control is

Remote effects

A cautious prognosis must be given for those infants who survive Mental retardation or other neurological sequels may occur (*see* Cerebral Palsy in Infants, page 437) Also some of the infants show a liability to convulsions well into childhood, and in such cases the use of anti-convulsant drugs (such as phenobarbitone, ¼ grain daily) will be necessary

REGINALD LIGHTWOOD
MALCOLM MACGREGOR

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TABLE

CLASSIFICATION OF 115 CASES OF INFANTILE CEREBRAL PALSY

Type	Number	Percentage
Monoplegia	3	3
Hemiplegia	10	9
Spastic paraplegia or quadriplegia	43	37
Flaccid quadriplegia	3	3
Athetoid	45	39
Chorea	1	1
Ataxia	4	3
Mixed types	6	5

TREATMENT

PREVENTIVE

Properly correlated clinical and pathological data are almost lacking but the

(asphyxia neonatorum or anaesthesia) is closely associated with the subsequent appearance of athetosis Spastic quadriplegia is more likely to be due to an early defect of neuronal development, though occasionally (7 per cent of the cases) it follows rhesus incompatibility (nuclear jaundice) Intracranial birth injuries are responsible in a number of cases Hydrocephalus and especially encephalitis are responsible for acquired cases

REMEDIAL

tre

afl

organized for such work The less severely affected can receive part of their treat ment attending as out patients for regular and fairly frequent physiotherapy This

are likely to fee

be for encourage-

s and by giving

attention to a number of practical details be in a position to show them how to help their handicapped child and how to get him to make the best of himself For these ends many aids have been devised and pieces of apparatus made while others can be improvised

and belladonna, which are contra-indicated, the bronchial secretions should not be diminished in quantity and rendered more viscid for fear of the formation of a

chloral and phenobarbitone

The use of sulphonamide drugs and penicillin, and in a few cases other antibio-

in the treatment, but experience shows that these agents are valuable; the persistence of infection and of fever is so often due to superadded microbial infection that many cases of bronchitis quickly subside when chemotherapy or penicillin is given Even more important is the fact that lobar and broncho pneumonic consolidation

to the sulphonamide drugs and to penicillin, namely, the possibility of preventing the development of empyema, or pulmonary collapse and bronchiectasis. More recently, aureomycin and Chloromycetin have become available for the treatment of respiratory infection of virus origin

OTHER INDICATIONS

In treating patients with acute bronchitis it may be necessary to give relief for a congested and obstructed nose, an inflamed throat, infected middle ear, sinusitis, or bronchial asthma, each of which is closely associated with infection of the tracheobronchial tree

CEREBRAL PALSY IN INFANTS

DEFINITION

ataxia, separately or combined Mental, visual and auditory defects may coexist

INCIDENCE

The condition is distressingly common Its incidence has been estimated in the United States of America to be 50 cases per 100,000 of the population (Duryea, 1941) It is thought that 4 out of 7 of those affected are educable and in need of physical treatment (Phelps, 1941), the remainder die in infancy or they are mentally defective In Great Britain the incidence of cerebral palsy is not known, but cer-

1948)

PROGNOSIS

The outlook depends chiefly on the mental status and on the degree of severity of the palsy The best results are obtained in ataxic patients while the spastic cases seem more difficult to help by muscle education than the athetoid Associated epilepsy increases the difficulties of treatment and may make it impracticable The arrangements for education are complicated by defects in the special senses Many of the patients tend to regress when treatment is interrupted, although Phelps (1946) says that by high-school age subsequent development tends to be automatic

ladelphia,
Saunders

(Chorea *see* Rheumatic Chorea)

COELIAC DISEASE (GEE'S DISEASE)

This condition has been called idiopathic steatorrhoea, chronic intestinal insufficiency,

attention now

Coeliac disease is not the only cause of chronic steatorrhoea in childhood a picture resembling it may be seen in a number of conditions, among which particular *attention must be given to fibrocystic* disease of the pancreas, starch intolerance, chronic infection (including giardiasis) in young children, and mechanically obstructive processes involving the small intestine and intestinal lymphatics, occasionally occurring in mesenteric tuberculosis, lymphadenoma, and similar conditions, attention must also be given to mal-absorption *in conditions such as* gastro-colic fistula and stenotic areas in the small intestine Since these several

resemble it

In addition, paediatric teaching now emphasizes the importance of conditioned deficiencies as components likely to complicate the coeliac picture These deficien-
are secondary to
untreated
treatment
of the underlying disease remains empirical

Physical education in postural and motor patterns

In congenital cerebral palsy these patterns of function have never been normally acquired—thus the treatment differs radically from that of poliomyelitis and similar conditions—and these patterns must be taught and developed in the order in which the normal baby would learn them For example, the automatic, reciprocal

and this is not done through formal exercises but by suitably assisted play and occupation

Apparatus and splinting

Special apparatus, such as skis for walking, cup and plate holders at meals, and specially shaped lavatory seats and chairs, is of much value not only in the physiotherapy but in the child's everyday life In spastics and athetoids marked deformities will need to be corrected by means of splints or surgery

Surgical procedures

Phelps and his followers agree that surgery (tendon lengthening, tenotomy, neurectomy, arthrodesis) has a definite place in the treatment of certain spastic patients but these measures are seldom indicated in athetoid cases In any case surgical treatment should be postponed until its need is certain and the child's mental status better known The strongest surgical indication is the relief of an

Drugs

Hyoscine, belladonna and atropine have been used in attempting to relieve the tremor and rigidity following encephalitis, and Benzedrine may be combined with hyoscine Derivatives of curare have been tried for reducing tension in athetosis, but much of the drug treatment of cerebral palsy is at an early experimental stage.

General management

The anxiety of the parents and the psychological difficulties of the patients are very real factors which require attention The family should treat the child as

made possible.

plan Paterson, Pierce and Peck (1944) advised parenteral crude liver—such as Proethron Forte, 2 millilitres on three days per week, and parenteral vitamin B complex, such as Lederle's B Complex or Benerva compound, on the alternate days These injections are somewhat painful and they can be discontinued after a month, the liver and vitamin B then being given by mouth, or Hepargiandol-B, which combines liver and vitamin B complex, can be given parenterally three times a week for a month

Vitamins A, D and C

In addition to the measures outlined in the last paragraph the other vitamin requirements must be adequately met Supplements of vitamins A and D can be [illegible] 8–15 drops, [illegible]

acid is used

Mineral supplements

Anaemia is a common complication, it is usually due to iron deficiency and so courses of iron (ferrous sulphate, 6 grains daily) are given frequently There is a [illegible] soaps, and this is the main [illegible]

are suitable)

Carbohydrate metabolism

It is usually stated that the low glucose tolerance curve, a characteristic feature, is *due to impaired absorption of glucose, though it could as well be explained as a* manifestation of hepatic glycopenia As long ago as 1921, Howland believed that [illegible]

becomes firm and free from gas, and the appetite returns, (2) addition of protein foods to basic diet of protein milk, and (3) gradual addition of carbohydrate to the diet

Starch intolerance

A new viewpoint has been suggested and developed by Andersen (1947) who believes the primary disorder to be a metabolic one consisting in a defect in diges*tion of starch by amylase Andersen divides coeliac disease into* (1) a basic starch intolerance, and (2) transitory steatorrhoea as a complication due to multiple *deficiencies* According to this hypothesis the logical treatment consists in an initial period (two months) of intensive vitamin and dietary therapy for the removal of the steatorrhoea This is followed by a prolonged period on a diet high in protein, [illegible]

TREATMENT

PREVENTIVE

Similarly, anaemia and coeliac rickets are less common than formerly because we have also learned to supply the vitamins of the B complex as well as the important minerals—iron, phosphorus and calcium

REMEDIAL MEASURES

As with other conditions for which there is no satisfactory treatment, so it is in

Fat restriction

For many years restriction of the fat intake, based on the belief that defective fat absorption is the primary fault, has been the sheet anchor While it is true that a low fat diet diminishes the number and size of the stools, it does not cure coeliac disease which continues to run its chronic course

Carbohydrate restriction

This also is necessary in some degree either on account of faulty digestion (?) or poor absorption, and without this restriction excessive intestinal fermentation leads to considerable abdominal distension The digestion of starch is considered in a later paragraph

Increased protein

With fat and carbohydrate having to be restricted it becomes necessary to supply most of the caloric requirement in the form of protein Many diets have been advocated and Paterson (1947) ad[illegible]

infection, it may be necessary to return to stage II or stage I temporarily This treatment has been much used in certain children's hospitals

Improvement of intestinal absorption

Formerly an attempt was made to improve absorpt[illegible]

and vitamin B complex parenterally, they were able to restore the low vitamin A absorption curve to normal and to improve glucose absorption Following this

BREAST-FED BABIES

In the breast-fed baby true constipation is somewhat unusual Underfeeding is the commonest cause, then pyloric stenosis and local anatomical defects of the bowel, then mental defect and very rarely true Hirschsprung's disease

Underfeeding —The stools of an underfed baby are small, sometimes dark green, and may be either frequent or infrequent Restlessness and failure to gain weight occur and the treatment is clear.

Stenosis —Anal stenosis is sometimes a cause of constipation, in which case the stools are narrow, ribbon-like and evacuated with some effort. The stenosis, which may be the aftermath of an operation for imperforate anus, is easily felt by the examinir [illegible]
effected [illegible]
should b [illegible]
Long-continued treatment is essential

Mental defect —Mentally defective infants are often constipated, feeding difficulties may contribute to this and also as they grow older they fail to benefit from [illegible]

Hirschsprung's disease —True Hirschsprung's disease invariably gives rise to symptoms from early infancy; intractable constipation is associated with increasing abdominal distension and with episodes of intestinal obstruction At intervals [illegible]

treatment finally but preliminary work suggests that it offers greater and longer relief than previous methods have done.

BOTTLE-FED BABIES

Although bottle-fed babies tend to pass stools more frequently than do breast-fed babies, constipation may occur and it is sometimes put down to the higher protein content of some artificial foods The addition of sugar to the feeds, or of [illegible]

There may be dangers in the constant administration of liquid paraffin to small infants The chief of these is the possibility of minute amounts of each dose entering the trachea and passing into the lungs It is probably wise to avoid giving paraffin to weakly infants and an emulsion is preferable to the plain oil in all cases When used over long periods it is advisable to give additional amounts of fat-soluble vitamins A and D

Starch free d et suitable for a child 2 3 years old

Breakfast	5 oz milk fruit helping of fruit puree with sugar 1 egg or small piece of finnan
Mid morn ng	5 oz. milk
Midday	2 oz lean meat or chicken or fish (3 oz) with clear gravy helping of purée of vegetable no potato puree of fruit or baked custard or junket 1 oz glucose
Tea	5 oz milk with cocoa etc 2 oz. of chicken or lean meat or fish (3 oz) helping of clear jelly or other sweet
Supper	5 oz milk flavoured as desired 2 oz. fish or lean meat tender lettuce or vegetable puree sweet as midday

The glucose is in addition to sugar ration The milk is gradually worked up from skimmed to whole milk

CONCLUSIONS

A new emphasis now given to the short preliminary dietary stage for replacing deficiencies and overcoming steatorrhoea followed by a prolonged period of starch free diet is probably a valuable departure in the treatment of coeliac disease, the benefits of which will be watched with interest by clinicians in Great Britain The return of appetite on such a régime is a remarkable feature and it should be accompanied by a good weight gain

REGINALD LIGHTWOOD

Andersen D H (1947) *J Ped at* 30 564
— and Hodges R C. (1944) In *Practice of Ped atrics* Ed by Brennemann Hagerstown Md Prior
Gee S (1888) *St Bart s Hosp med Rep* 24 17
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CONSTIPATION IN INFANTS AND CHILDREN

As constipation is a symptom that may arise from many causes, its treatment must be considered in relation to its aetiology and it is best discussed under two headings

CONSTIPATION IN INFANCY

By constipation is meant the passage with difficulty of small hard motions which may be infrequent The misapprehension that infrequent passage of normal motions is a symptom needing treatment brings many parents for medical advice and leads many more to give unnecessary aperients to their children The breast fed baby in particular is liable to have a bowel rhythm varying within wide limits and periods of 2 3 days between evacuations need cause no concern If more than two days pass without a stool then digital stimulation will usually be effective

Remedial Treatment

When chronic constipation is established, the first step should be to attain thorough evacuation of the lower bowel with a simple enema, which may be repeated daily until there are no longer palpable abdominal masses or distension The child's diet must be [illegible] natural defaecation daily, [illegible]

[illegible] in the treatment of chronic constipation.

As regular defaecation is re-established the dosage of paraffin emulsion should [illegible] or months it may be possible to with- [illegible]

habits newly acquired have become permanent

REGINALD LIGHTWOOD
MALCOLM MACGREGOR

Bodian, M , Stephens, F D , and Ward, B C. H (1949) *Lancet*, 1, 6
Cameron, H C (1946) *The Nervous Child*, 5th ed London, Oxford University Press
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ENURESIS

DEFINITION

Enuresis denotes involuntary micturition beyond the age when control of the bladder should be acquired, that is, by 2–3 years of age at the latest.

CAUSATIVE FACTORS AND THEIR TREATMENT

The treatment of bed-wetting is based in the first place on the correction of all aetiological factors, both causative and aggravating It is often due to a number of coincident factors and it is essential that so far as possible all of these should be taken into account in planning treatment A full history as to health and illness will be asked of the child's mother, who should also be asked about the child's character and personality, having in mind that many enuretics are lacking in confidence, or are timid, easily-frightened children, even afraid of a brother or sister, sometimes with good reason, others are undisciplined, restless and "highly strung", on the other hand some are apathetic or mentally deficient and the medical practitioner should be on the look out for mental deficiency because it is a handicap to successful treatment.

Physical causes

Physical examination must be detailed Systemic disease such as chronic general *infections, diabetes mellitus, diabetes insipidus* and chronic nephritis are all-important, as is any disease or disorder which interferes with the child's sleep at night It should be borne in mind that enuresis is simply impaired bladder control

CONSTIPATION IN OLDER CHILDREN

Apart from the organic causes of constipation that have been mentioned already, which may of course continue into later childhood, constipation in this age group is generally due to an atonic bowel This comes about in several ways, but when constipation has been present for some time secondary dilatation of the proximal bowel may follow and become conspicuous enough to raise the suggestion of

proper habit, constipation will result, and if no routine at all is followed it is some-

or later To begin with they prove successful, but unless the child s habits are

intestinal atony Indeed regular laxatives are deleterious even to an unconstipated child, and the old fashioned weekly "dose' should be deprecated Though this sequence of events is common there is no doubt that some children are of more costive a constitution than others and in these chronic constipation is a menace unless regular habits are kept Ill, malnourished or debilitated children, or those convalescent from illness, are also especially liable to constipation

Constipation may be part of a behaviour problem when it follows the deliberate retention of faeces either through the memory of the pain of an anal fissure or as a manifestation of "negativism' (Cameron, 1946) The common age for this lies between 2 and 5 years

TREATMENT

Preventive Measures

Bowel training should begin early in infancy Children vary in their bowel rhythm but are fairly consistent in their own pattern whether they defaecate twice daily or only every two days The rhythm of a particular child can be recognized quite early by his parents, and thereafter he should always be made to go at the appropriate times

Diet

Some attention to diet is required for the child who is naturally sluggish in bowel habit His diet should contain adequate cellulose "roughage", which is derived from coarse cereals (such as bran and wheat flakes) and vegetables, and fresh fruit Milk intake should not usually exceed a pint a day In infants and young children an increase in dietary sugar occasionally helps Salads are usually helpful especially those containing a proportion of finely shredded raw green vegetable Some children become constipated if they do not have enough outdoor exercise

Other factors

Some of the other factors responsible for, or contributing to, the persistence o enuresis are given below

Nutritional faults —Inquiry should be made as to the child's food in regard to it quality and body building value, and also as to salty foods which increase thirst

Fluid intake —

since a child may

through the day,

drink after 6 p m .

Deep sleep —It is well known that enuresis is more likely to occur in a deep sleep and for this reason amphetamine (or dextro amphetamine), 5 milligrams, is sometimes given at bedtime, for a child of 5 years or over, because it lightens sleep

Disturbed sleep —In poor and overcrowded homes there are many causes for disturbed sleep at night such as noise from outside, in the house or in the room where the child sleeps, or more than one child may be sleeping in the same bed These causes of disturbed sleep should be mitigated or removed as far as possible

Cold weather —Enuresis tends to be worse in cold weather and advice should be given as to clothing in daytime and the provision of sufficient bed-clothes at night

Poor lavatory accommodation —*This may give rise to enuresis It is best that the* child be provided with a chamber close at hand but even so the child, because of being afraid of the dark or on account of cold in winter, may consciously or un consciously hesitate to use it These things should be brought to the mother's notice and the child's co operation secured

Ammonia dermatitis —Up to about 18 months when napkins are still in use it is a common thing for non pathogenic bacteria to multiply in the urine soaked napkin and *Bacterium ammoniagenes is one of the organisms commonly found* in this medium It is important because it forms ammonia from urea under conditions favourable to its activity and the ammonia is a cutaneous irritant causing napkin dermatitis also balanitis in the male infant, meatitis in the circumcised child or urethritis in the female infant In the enuretic child, although napkins are no longer ... dermatitis may occur and it may be a *contributory* factor ... break this circle ... older child cotton under-pants worn which should be rinsed before use in an antiseptic, such as saturated boracic solution, 1 4,000 perchloride of mercury or Diaparene and then dried This prevents the multiplication of *Bact ammoniagenes* and the formation of ammonia

TREATMENT OF THE PATIENT

... the doctor ... son for ... be an ... arkable ... hildren,

how often a child will speak simply and frankly ...

and just as an adult who is restless and sleepless at night may, on that account

should be made as to any history suggesting *petit mal* attacks, and sometimes nocturnal enuresis is the only manifestation of epilepsy occurring during sleep Local causes must be especially looked for, and a careful examination of the urinary tract may lead to the diagnosis of urinary infection, congenital hydronephrosis, or renal tuberculosis, other local diseases include balanitis, meatal ulceration and vulvo vaginitis Each of these diseases and conditions provides its own indications for treatment

Home influences

Enuresis is often due to faulty training, the result perhaps of the child s mother being ill overworked or, simply, being careless, or she may be buoyed up by the belief that the child will soon outgrow the condition The mother s attitude towards the child should be carefully noted because the extra work involved and other considerable difficulties caused by this tiresome habit may make the mother resentful or even antagonistic to her child (perhaps unconsciously) If the mother

hospital but for obvious reasons convalescent homes do not accept enuretics

find that he can be dry at night, then he will often recover confidence and there may

organization, local authority influence or even perhaps through the courts

Psychoneurosis

Enuresis may be the symptom of a neurosis and a part of a complex behaviour disorder of which the cause is not clear, such patients should be referred to a psychiatrist

Training and discipline

FAECAL INCONTINENCE

ORGANIC CAUSES

Soiling may be caused by organic lesions, such as abnormalities of the rectum or anal sphincter, cerebral or spinal diseases or injuries, and infections or toxic conditions in which there is general weakness delirium or stupor In such cases management of the condition consists purely of nursing and its treatment is that of the causative illness

DISTURBANCES OF FUNCTION

Faecal incontinence that does not result from organic causes (sometimes spoken of as encopresis) often develops side by side with enuresis, and many of the observations under that heading are applicable

OLDER CHILDREN

[illegible] of th s k nd s less common than en res s and [illegible]

YOUNGER CHILDREN

In younger children faecal incontinence may arise from simpler causes and will then respond rapidly to simple treatment

Retention of faeces in the rectum

[illegible] to defae [illegible]

faeces may leak through the sphincter ani quite involuntarily It is characteristic of this type that the rectum is full of hard faeces, and the small quantity of fluid material which passes this obstruction causes the frequent soiling Worry and feelings of shame add to the distress which the condition soon occasions

Treatment —To treat this form of incontinence the rectum must be emptied by enemas until normal sensation returns to it and the child s confidence is restored [illegible]

develop and this, too, must [illegible]

Painful defaecation

[illegible] produces a painful fissure in ano [illegible] fearful [illegible] *Treat* [illegible] pot [illegible] taken regularly for a period to avoid further constipation Such cases [illegible] up a few weeks

Negativism

Incontinence may result from negativism as a reaction from too early or too strenuous sphincter discipline The symptom here is but one aspect of parental

though to achieve this the child must be interviewed alone The child's co-operation is as important as the mother's and it is a great help to evoke in the child a desire to be cured of his complaint, that is to say a wish to sleep in a dry bed It is this positive attitude which must be instilled into the child's mind Dry beds should be counted and encouragement given—most often it is wet beds that are emphasized The [illegible]

co operation and create in him a sense of responsibility for his conduct which is so necessary for successful treatment

The Value of Suggestion

It will be realized that psychological factors play a large part, either as the main cause or a contributing one, as when the patient becomes obsessed with shame or the fear of failure Experience shows that the single item in treatment which has most success is "suggestion" and this may have to be deliberately applied Thus, the personality of the medical practitioner and the confidence he can inspire, largely determines the result of any treatment, medical or otherwise, and he should never omit to assure the patient that the treatment to be followed is almost infallible and also to ask him to report back in a week or two to tell him of his success

Medicinal Treatment

Belladonna is the drug which has been most commonly used for the treatment of enuresis and the fact that it relaxes the fundus of the bladder and has no effect on the sphincter makes its use rational Batty (1948) advises the prescription of a pill containing dried extract of belladonna, $\frac{1}{4}$–1 grain, 3 times a day In his experience a child aged 5 years generally tolerates $\frac{1}{8}$ grain 3 times daily, and one aged 12, $\frac{3}{4}$ grain given at the same frequency He advises moderate dosage short of symptoms of belladonna intolerance and the duration of continuous treatment should not exceed 6 months Adrenaline has the same effect as belladonna in causing the bladder [illegible]

Surgical Treatment

Boys who require the operation should be circumcised The use of cystometric measures aimed at increasing the capacity or tolerance of the bladder is debatable and not very often successful but the pattern of filling shown by cystometry may give information (Nash, 1949) Dilatation of the urethra has proved effective in experienced hands but is not generally advised

Batty, R J (1948) *Enuresis or bed wetting* 2nd ed London Staples Press
Nash, D F E (1949) *Ann R Coll Surg Engl*, 5, 318

ducts, and this does much to prevent the complication of severe puerperal brea engorgement Brushing the nipples and treating them with hardening fluids ar needless and sometimes harmful procedures. It is customary to put the baby to th breast about 8 hours after birth, although secretion in any quantity is not to b expected for 2–4 days after birth The *object of putting the baby to the breast earl* is for it to obtain colostrum, to accustom the mother to the feel of the infant and to stimulate the physiological processes concerned with the secretion of milk In th first few days the baby's small needs are for fluid rather than for nutriment Th *following régime is satisfactory*

For the first 48 hours apply the baby to the breast 6-hourly, and allow him to suck for 1–3 minutes on each side From the third day give the breast every 3 or 4 hours and allow the baby to suck for 5 minutes on each side, increasing the time by one *minute each day until at 8 days the maximum of 10 minutes on each side i* reached

Many babies will obtain plenty of milk in a shorter time If at first the breast milk is slow in coming in, small quantities of water may be fed to the baby with a spoon after he has been to the breast When he has finished the mother should express manually any considerable surplus of milk that remains in the breasts in

reduces that pressure, excites a further secretion

It has now been shown in the case of the goat that the expulsion of milk from the alveoli and ducts is due to the activity of contractile cells in their walls, a function regulated by hormonic and reflex activity

Frequency of Feeds

The choice of a 3-hourly or a 4-hourly régime should be guided more by the behaviour of the baby than by arbitrary rules In general, small babies do better on the more frequent system, yet there need be no hesitation in altering the chosen schedule if necessary Both breasts should be used at each feed, because feeding from one side and alternating from feed to feed provides a less vigorous stimulus to secretion The first and last feeds of the day permit some latitude in their timing, in the first few weeks a small feed in the middle of the night may be given to a weakly

dried milk, given with a spoon after the breast feed, should be given if the seve day weight is not appreciably in advance of the fourth day weight

Underfeeding

rather than allow it to continue and so

as the breast output increases From the tenth to the twelfth day is the danger period for breast feeding At this time there is often a drop in output coincident

mismanagement which extends usually into many departments of the child s life He becomes violently antagonistic to "potting' and defaecates regularly into his clothes This behaviour is associated usually with temper tantrums and excessive *dependence upon his parents Treatment* of the incontinence requires that the parents display no emotion over the child's refusal to defaecate at the proper time and place When the child realizes that he no longer creates the expected distur bance by his unorthodox behaviour, he discontinues it This goal may take some months to reach and is assisted by giving common sense advice to the parents about the general upbringing of the child

REGINALD LIGHTWOOD
MALCOLM MACGREGOR

Shirley H F (1938) *J Pediat* 12 367

FEEDING OF INFANTS

BREAST FEEDING

If we are to secure for an infant the best chances of survival and health, breast feeding hould be advised for the first six months with a minimum period of three

the infant, it also has the advantage of economy It is safer for the prevention of dyspepsia and infection although improved alternative methods introduced in the last quarter of a century, have made less obvious the value of natural feeding as a prophylactic against gastro intestinal disturbances in the babies of the better favoured economic classes

The superiority of human milk in promoting the physical health of infants is

shield should be obtained and worn continuously by this means it is often possible to evert nipples that would otherwise prove too retracted to allow successful suckling From the sixth month a woman should massage her breasts and nipples daily, and towards the end of her pregnancy she should attempt to express secretion from each side in small quantities The aim is to open up the terminal parts of the milk

diseases offer no obstacle to breast feeding if the wish to feed is there, for a physique capable of gestating and giving birth to the infant is in most circumstances capable also of feeding it, but the mother s health should be considered Under nutrition in the mother is a reason for avoiding or shortening breast feeding because the milk yield may be inadequate or the maternal deficiencies exaggerated

ARTIFICIAL FEEDING

milk (the milk of goats asses and mares has also been used) and milk substitutes

and carbohydrate content approach the composition of milk

The newborn baby possesses the means to digest and absorb most ordinary food

complex carbohydrates cannot be dealt with in the early weeks but in the second half of the first year of life there is a less sharp dividing line between the digestive powers of the infant and those of the adult The modern history of artificial feeding is that of the attempt to modify cow s milk so as to produce a food on which infants thrive as well as they do on the breast Complete success has not been achieved but a normal baby will flourish on any reasonable artificial feeding Cow s milk need not be slavishly humanized that is made to correspond quantitatively with human milk as regards levels of constituent protein, fat and carbohydrate *The following are some guiding principles in designing a suitable infant food from cow s milk*

PROTEIN

The protein must be modified in some way before administration Raw cow s milk curdles in the stomach into large aggregates of casein unapproachable by enzymes which some believe to be mechanically irritating It may be that cow s milk serves to accustom the calf to the early intake of coarse solid food and it contrasts with the behaviour of human milk which is transformed in the stomach into small soft curds separable with difficulty from the fluid whey The heavy curd of cow s milk is a cause of digestive upset in infants *although provided the curd size can be reduced to about that of breast milk* cow s milk protein seems to be as ... h man prote n tho gh it is necessary to give it in slightly larger

acids in the

w s milk by

reducing the protein to 2 per cent or lower succeed less well than other modes of

se pre-coagula

ally all milk for

with the mother getting up and returning home from the hospital or nursing home.

[illegible]

the doctor must be vigilant for this danger, and the mother prepared to expect a temporary reduction in milk flow at this time When possible it is best to avoid sending the baby home until a satisfactory rising weight curve is established.

DIET OF NURSING MOTHERS

The mother's diet during pregnancy and lactation should, of course, be a liberal and well distributed one, and should include a pint of milk daily, and during lactation a considerable fluid intake is desirable Various lactagogue foods and medicines have been claimed to stimulate milk production, but there is no evidence that their effect is greater than that of a well balanced diet Rest and a tranquil mind are of great importance to the nursing mother

VITAMIN SUPPLEMENTS

[illegible]

WEANING

At 4-6 months of age additional foods may be added to the baby's diet in small

[illegible]

about 4-6 weeks on weaning.

CONTRA-INDICATIONS TO BREAST FEEDING

Absolute contra-indications to breast feeding are very few, pulmonary tuberculosis in the mother being the most certain one. Most other chronic maternal

Vitamins

Vitamin supplements containing vitamins A, C, and D are necessary for the artificially fed baby

Fluid and Energy Requirements

Without entering here into the minutiae of infant feeding, it is necessary to discuss the optimal bulk and energy content of the feeds To maintain an infant in fluid bal ance it is found that a daily fluid intake of 2–3 fluid ounces per pound of body weight is required, the smallest infants demanding the larger figure, the requirement lessening as the infant becomes older and heavier, 2½ ounces per pound of expected body-weight is the accepted rule for calculating the fluid needs of a full term infant from the end of the first week of life It is found that when the energy content of this volume of fluid is standardized at 20 calories per ounce (the energy value of breast milk) a satisfactory weight gain is obtained, until a total daily volume of 35–40 ounces is being consumed When this intake is reached additional calories must be added without increasing the fluid volume further, and this is usually achieved by incorporating cereals, such as wheat or oat flour It is a valuable simplification to arrange that all feeds are standardized to contain 20 calories per ounce, and if this is done the rule of 2½ ounces per pound of expected body weight per day will be an [illegible]

Frequency of Feeds

Babies of 6 pounds and over will usually thrive on 5 feeds at 4-hourly intervals, but a few infants in the neonatal period (that is to say during the first 4 weeks of life) will be found to thrive better on 6 feeds at 3 hourly intervals because they do not tolerate a volume of more than about 3 ounces at a feed and this may be in sufficient for their needs After a few weeks the 3 hourly interval can be lengthened to 4 hours, and the feeds reduced in number to 5 in the 24 hours Exceptional infants will manage well on 4 feeds a day after they are about 3 months old

Changes in Feeds

A change in the feed should not be made unless a definite indication exists, and any necessary change is best made in stages because abrupt changes, either in volume or in composition, may upset a baby

So-called Feeding Difficulty

If we encounter the symptoms of a feeding difficulty we should remind ourselves that, in these days when the composition of feeds is relatively well understood, it is commoner to find the mistake in the technique of administering the feeds rather than in their composition, or possibly that there may be some disorder in the baby itself, such as an infection, or a congenital pyloric stenosis After checking the details of the preparation and quantity of the feed, we should next ask the mother to describe how she gives the feeds, the time spent on them, the way the baby sucks,

infant feeding nowadays is either boiled, acidified, dried or evaporated, each of which processes has the desired effect on protein Simply bringing cow's milk to the boil will reduce the size and density of the curd, and this effect is increased in proportion to the length of heating Dried milks, such as National Dried Milk, Cow and Gate, and Ostermilk, have become the standard method of artificial feeding in Great Britain in these milks the curd is so modified by the process of drying that it is dealt with even when reconstituted at full strength Moreover, other modifications such as the reduction or removal of fat (half-cream or skimmed dried milks respectively) may be carried out readily before marketing the milk powder Most full cream dried milks are so prepared that 60 grains by weight (delivered by the volume of one "measure) mixed with one fluid ounce of water reconstitutes whole milk Unsweetened evaporated milk, such as "Ideal" or "Carnation" tinned milk, prepared by heating milk at 180° F until 55 per cent of its water has been lost, is another satisfactory infant food It is prepared from fresh milk of a high fat content and the protein curd is soft and flocculent The feeds are easily

older infants may object to the taste

FAT CONTENT

The percentage of fat in cow's milk should be reduced, especially during the neonatal period, because fat is the element in cow's milk most difficult for the infant to digest The low fat content of colostrum suggests that fat tolerance is low during the early days, despite the fact that the lipolytic enzymes are present, and true digestive upsets in infants are to be ascribed more often to fat intolerance than to dis turbance by other elements in the diet In consequence, it is the usual practice to

SUGAR

Human milk contains more sugar than that of the cow, suggesting that the infant has a larger requirement Hence sugar should be added and it is a matter of experi-

and is scarcely sweet to the taste, is much used in the feeding of sick infants but is not necessary for normal ones

can be detected, but competent observers such as Miller (1926), Véghelyi (1939)
a
c
t
a
b
a
more frequent, bulky, fatty and offensive, and, as mucus may be present, colitis and dysentery have to be considered

TREATMENT

Preventive

Cleanliness in the preparation of food and attention to personal hygiene by the carriers are the most useful prophylactic measures It should be mentioned that an outbreak occurring among the children in a day or residential nursery or similar institution is likely to be caused by a carrier

Remedial

Mepacrine Hydrochloride (*B P*) is given in tablet form by mouth, according to the dosage given in the following Table (Franklin, 1942)

TABLE

Dosage of Mepacrine Hydrochloride in the Treatment of Giardiasis

Age	Daily dose in 0 1 gramme tablets	Duration of treatment in days	Total (grammes)
Half to 2 years	¼ tablet twice	3–5	0 15–0 25
2–6 years	½ tablet twice	3–5	0 30–0 50
6–9 years	½ tablet thrice	4–5	0 60–0 75
9–10 years	1 tablet twice	5	1 0
Adult	1 tablet thrice	5	1 5

PROGNOSIS

Mepacrine treatment is highly effective, the flagellated parasites disappear almost immediately from the stools and the cysts usually disappear in a few days The diarrhoea may cease at the same time, sometimes more slowly, it has been observed that there is an improvement in fat absorption as a result of successful treatment (Véghelyi, 1939)

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Franklin, A W (1942) *Arch Dis Childh*, 17, 60
Miller, R (1926) *Arch Dis Childh* 1, 93
Véghelyi, P (1939) *Arch Dis Childh* 14, 155

how many minutes it is held up for eructation, and the like It is often of critical value to see a feed being given, noting the mother's proficiency and also taking the opportunity, in a suspicious case, of watching for the physical signs of pyloric stenosis

Aerophagia

The symptoms and causes of aerophagia must be explained to the mother because it is the commonest difficulty Her baby may suck noisily with the lips not properly closed on the teat, swallowing air the while, or he may be getting his feeds too slowly (20–40 minutes) because she erroneously believes that taking slowly will

well.

The treatment of aerophagia is to teach a correct technique in feeding A carminative mixture such as Mistura Carminativa pro Infantibus (*N F*), 4 millilitres after feeds, may be a suitable aid, or the following may be given after feeds, the dose being 4 millilitres, diluted with a little water if necessary

Sodium bicarbonate	1½ gr	100 mg
Aromatic spirit of ammonia	1½ min	0 09 ml
Compound tincture of cardamom	2½ min	0 16 ml
Glycerin	5 min	0 3 ml
Dill water to	60 min	4 ml

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REGINALD LIGHTWOOD

Cassell

GIARDIASIS

AETIOLOGY

The parasite *Giardia lamblia* is widely distributed in the world but is less frequently found in temperate countries than in the tropics and subtropics The incidence is fairly high in children, with its maximum at about the age of 6 or 7 years The parasite lives chiefly in the duodenum and it does not necessarily cause symptoms There are two stages, the encysted stage and the active or flagellated stage, the cysts may be seen in considerable number in the stools of carriers, while during attacks of diarrhoea both cystic and flagellated forms are seen when wet specimens of faeces are examined under the microscope The parasite may be absent from the stools for considerable periods

SYMPTOMATOLOGY

Opinions differ in regard to possible pathogenicity of this parasite, and perhaps this is because for each patient with clinical symptoms many symptom free carriers

and then washed with successive descending concentrations of alcohol to eliminate extraneous material The hapten fraction is finally extracted with ether The potency of the hapten preparation was shown by specific inhibition of agglutination by antibody *in vitro* and by complement fixation, the hapten itself is not antigenic in human beings until re-combined with protein After injections of hapten (100–200 milligrams at fortnightly intervals) a fall in the antibody titre was observed 4–7 days later, clinical trials are being made (Loughrey and Carter, 1948) At the time of writing there are no reports of others having succeeded in preparing Rh hapten

When the results of the antibody tests lead to the expectation that the baby may be affected preparations for the immediate postnatal transfusion of the infant with compatible Rh negative blood should be made

REMEDIAL

The treatment usually required for an infant sensitized by Rh incompatibility is Rh negative blood transfusion It is necessary to discuss when and how to transfuse and the amount of blood to give

Treatment of incompatibility recognized during pregnancy

those requiring transfusion some may be successfully treated with an ordinary single transfusion but severe cases are probably best treated with an exchange ... blood
fant
14 8
grammes per cent may be expected to show serious symptoms The technical ... Medical

alternately until a total of 1 pint of blood has been exchanged The effect of ... to replace 80-90 per cent of the infant s red cells and to remove in addition a great part of the circulating maternal haemolysin When this procedure is used only one transfusion is required

Treatment of incompatibility recognized after birth

If the condition is not recognized before birth usually the first intimation is that the baby becomes jaundiced or anaemic about 24–48 hours afterwards Transfusion at this stage is contra indicated unless the degree of anaemia requires it

HAEMOLYTIC DISEASE OF THE FOETUS AND NEWBORN

The three component manifestations of haemolytic disease of the newborn (erythro-

jaundice is even better than in those with icterus gravis

TREATMENT

PREVENTIVE

Blood transfusions

this precaution This implies that from infancy to the menopause all females should

Pregnancies

Early in pregnancy the Rh type, if not already known, should be determined If the woman is found to be Rh negative, her blood should be examined for the presence of Rh antibody (agglutinating and incomplete varieties) at the thirty-

damage to the foetus, although induction should not be done before the thirty-second week as the risks of prematurity will be added to those of Rh disease

The Rh antigens comprise a group in which D antigen is most commonly to blame, yet even when a mother is found to be Rh positive, there is the possibility

No method of prevention is yet generally available for the purpose of desensitizing the mother Weiner and Sonn (1946) have suggested the possibility of inhibiting the formation of Rh agglutinins by means of a competing antigen, for example pertussis or typhoid vaccine, Karlher and Miller (1947) have attempted by chemical means to prevent antigen from calling forth an antibody response using ethylene disulphonate (Allergosil Brand) by weekly intramuscular injection during the last months of pregnancy By using injections of Rh hapten, absorption and neutralization of antibody after its formation has been claimed by Carter (1949) The Rh hapten, a lipoid substance insoluble in water, is prepared from pooled Rh-positive blood of all available subtypes. The erythrocytes are laked

HIRSCHSPRUNG'S DISEASE AND IDIOPATHIC MEGACOLON

DEFINITION AND RECOGNITION

When either partial (segmental) or total dilatation of the large intestine exists the condition is called megacolon There are several types of megacolon, in some of the cases the cause is known, while others are idiopathic and some are symptomatic

HIRSCHSPRUNG'S DISEASE

[illegible]

Stephens and Ward, 1949) The distal segment, in which this defective neurohistology can be demonstrated, lies immediately above the rectum and measures between 1 and 12 inches in length, here, owing to the lack of parasympathetic activity,

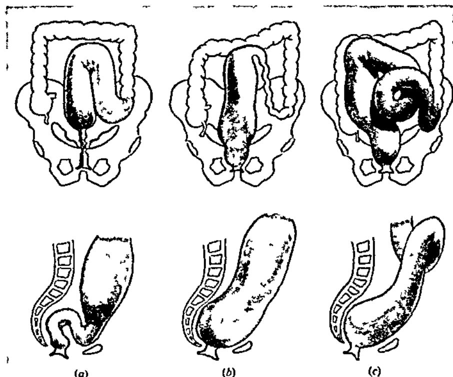


FIG 12—Showing radiographic appearances of (a) Hirschsprung's disease compared with (b) the terminal reservoir and (c) tubular dilatation seen in idiopathic megacolon (*By courtesy The Lancet*)

there is no co ordinated propulsive movement to aid evacuation, and the unopposed sympathetic activity causes spasm of this distal segment which can be shown ... and the recto- ...n of

because there is no evidence that simple transfusion diminishes either the jaundice

pro Infantibus (*N F*) 2 millilitres twice daily) and the infant should be followed up for 6 months or more to see that the anaemia is cured and also to detect the possible after effects of haemolytic disease It would appear that Rh antigens are not absorbed in a significant quantity from breast milk (Cathie, 1947) and breast *feeding can be advised*

COMPLICATIONS

Kernicterus (staining of the grey matter of the brain) is the most feared complication It is probable, though not yet certain, that exchange transfusion at birth offers the best chance of preventing or lessening it For kernicterus there is no remedial treatment and, in the absence of anaemia, ordinary blood transfusion is

have been recorded

AFTER EFFECTS

affected, whereas if it is homozygous all will be affected The genotype of the father can be ascertained by using appropriate testing sera and this should be done if there is a desire for more children The risk is not lessened by lengthening the intervals between pregnancies

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Carter B B (1010) *J* [illegible]

Stationery

Office

Weiner, A S, and Sonn E B (1946) *Amer J Dis Child*, 71, 25

TREATMENT

Preventive

Premature births

The prevention of premature births consists in good antenatal supervision and in seeing that the mothers get enough food of the right type and variety, including sufficient protein, fat, mineral salts and vitamins. Under the Ministry of Food priority schemes the expectant mother can get one pint of milk per day at 1½d,

average total requirement is in the region of 2,500 calories, therefore, the adage that an expectant mother should "eat enough for two" is exaggerated—it is the quality more than the quantity that matters.

Special neonatal risks

For the prevention of the special neonatal risks encountered by premature babies attention must be given to a number of points.

(a) When born the premature baby should be handled with great gentleness, particularly if the initiation of respiration is delayed and resuscitation is needed. No time should be lost in placing the infant in a previously prepared and heated cot. These babies are more subject to hypoprothrombinaemia than are full-term infants, with a consequent tendency to bleed easily, and an intramuscular injection of vitamin K analogue, 5 milligrams in aqueous solution, should be given routinely as soon as possible after birth.

(b) Attacks of cyanosis are common in premature babies and there are many causes. Sometimes the blueness is due to apnoea and the colour improves when the baby is gently stimulated; in other cases it is due to handling or chilling; but more often it is associated with intra-cranial damage or atelectasis. Another common

Use of, page 478).

(c) Measures for the maintenance of body temperature are necessary in prema-

is more or less unstable; it may fall to dangerous

heat is

ited in

s heat

be to

the distal segment is the chief cause of the obstruction and the rational treatment of Hirschsprung's disease follows from this

Idiopathic Megacolon

below to the pelvic colon above, which is longer and wider than normal and lacks haustration

Symptomatic Megacolon

Symptomatic megacolon may be diagnosed when an organic cause producing partial colonic obstruction is demonstrable, for example, anal stenosis, membranous valve-like lesions in the anus rectum or colon, and long mesenteric attachments of the sigmoid resulting in a partially obstructing volvulus

The differential diagnosis of these conditions is very important and it can be established by a careful history, by physical and radiological examination and by sigmoidoscopy.

TREATMENT

Hirschsprung's Disease

Curative treatment

remain and dilatation of bowel above the colectomy will take place Colostomy may be required as a life-saving measure to relieve obstruction, but the symptoms will return with closure of the colostomy

Recto-sigmoidectomy is the rational treatment and it has given immediate results which are good, but the operation is new and its late results are not yet known Swenson and Bill (1948) working at the Boston Children's Hospital, have devised an operation to remove the narrowed distal segment by a pull-through technique which preserves the sphincter, while Stephens (1948) has performed recto-sigmoidectomy at the Hospital for Sick Children, Great Ormond Street, London, stage by stage and by a different technique At the first operation right-sided transverse spur colostomy is performed Then after some months, during which the patient improves in health the abnormal distal segment and the rectum are removed by abdomino-perineal operation, the distal segment being intussuscepted

lack of home manufacture this is not yet the case in Great Britain, although, if heated with ... Fig 14, page ... 478) If this t ... er of the coverings and an hourly record of the cot temperature charted.

Nutrition

The smaller the baby the wiser it is to wait some hours (twelve—or more) before attempting the first feed This feed is apt to be a more or less dangerous experiment because the activity of the swallowing reflex has not been determined and so it is wise to use a little sterile water for the test The method of administering the *early feeds depends on vitality. If the infant is too weak to swallow,* oesophageal or stomach feeding with a fine rubber catheter will be needed (a Jacques catheter, size 4, or a urethral catheter, size 4) The technique for tube feeding is important and a wrong technique may be decisive for failure. The length from bridge of nose to tip of ensiform cartilage is marked on the catheter with sewing cotton, when passed to the mark the catheter reaches the lower end of the oesophagus, when passed another inch it reaches the stomach, more care is required for stomach feeds, and oesophageal ones are usually better. A small pipette, or the glass barrel of a syringe (not a wide glass funnel), is attached The head of the cot should be raised to 30 degrees and the infant placed on its right side The catheter is passed through the mouth, and then the feed is given slowly and without allowing the introduction of air The danger of tube feeding is the risk of reflux into the trachea This is avoided by the position of the baby and by allowing plenty of time for the ... *which should be done* ... id in the ... iurse has

If sucking is impossible but the baby can swallow, a pipette or spoon may be used Assisted sucking such as a Belcroy feeder affords is useful for small babies who ...

... d there ...

followed

The stabilized fluid and caloric requirement, that is, the intake provided after about 10–14 days, is greater in premature than in full term infants, in the ratio of almost 3 to 2, but this intake should be only reached by deliberate steps In the first few days a smaller volume is given because these babies may become exhausted by ... there may be cyanosis or vomiting After this warning it may be

make the difference between the baby and its immediate surroundings fairly small, but it should not be too small because provision must be made for the fact that some heat is naturally dissipated during respiration The baby's temperature

electric heating is in use In some countries attention is turned more specifically to raising the air temperature of the whole room, and then it is important to increase the humidity as well For infants weighing under 4½ pounds the relative humidity should be about 65 per cent, larger infants do better with less humidity Crosse (1945a) deals with this subject in greater detail

(d) Because of their low powers of resistance premature babies are easily infected and many of them die from this cause Such deaths are often wrongly

followed (*see* Neonatal Infection, page 474)

General arrangements

Premature babies can be nursed either in the mother's home or in an obstetric department equipped with a special nursery

Domiciliary care can be employed for larger and stronger infants but nursing skill and also certain equipment are required, such equipment includes a draught

If the infant is to be transferred from the place where it was born to hospital, it should be done immediately, that is before chilling and infection have occurred or defective swallowing has resulted in inhalation pneumonia The best results are obtained when expert treatment is available from the moment of birth, Crosse (1945a) found a considerably higher mortality in transferred cases The environment of a prematurity unit in an obstetric department is more satisfactory for a healthy infant than is that of a sick children's hospital, breast feeding and the care of the mother are also simpler, but for the treatment of abnormal infants the resources of a paediatric hospital department may be needed

The design of a prematurity unit will be determined partly by the particular *technique it is intended to employ The infants are nursed in warmed cots accom*modated in a premature baby ward which in a few cases is air-conditioned, or use may be made of oxygen incubators The latter are now becoming generally used in the countries in which they are available, but owing to import restrictions and

Amino-acid feeding.—It has recently been suggested, partly on theoretical grounds, that in very small premature babies breast milk may be inadequate for their assimilative needs, especially in amino acids, and the use of hydrolysed casein (75–150 minims per 10-ounce intake) when substituted for the caloric equivalent of breast milk has, it is claimed increased weight gain (Jorpes, Magnusson and Wretlind, 1946) and nitrogen retention Clinical experience with breast milk is in the main quite satisfactory even for these small premature infants and the value of amino-acid feeding, although worth further investigation, has not been convincingly established or generally accepted Protein in the form of dried human plasma has also been suggested as a protein supplement

Extra fluid should not be given to premature babies in the form of saline solution on account of the risk of oedema which is common

the feed schedule should be chosen with care Among the types of feed which are favoured are Frailac (Cow & Gate, Ltd), half-cream dried milks such as Cow & Gate brand and Ostermilk No 1, and diluted whole-cream dried milks with added sugar, or humanized dried milk, also sweetened evaporated milk Having chosen the feed it is then well to stick to it if possible, making no changes without clear indications The quantity will need to be worked out according to the estimated caloric needs of the infant and will be based in the first place on the weight of the baby, but considerable individual variations exist By the tenth or the fourteenth day the maximum requirement can often be reached (between 60 and 80 calories per pound) but, owing to increased risk of indigestion and intolerance with artificial feeding somewhat more caution is required than with breast milk Before the tenth day the caloric intake is worked up gradually but steadily as described above for breast milk

Supplemental vitamins.—These are much needed because of the rapid growth occurring in the premature baby and its increased liability to rickets Vitamins A and D can be given from the end of the first week in concentrated form a small daily dose of vitamin D is gradually increased until at one month old the infant is receiving 1,600 i u daily with the associated vitamin A, that is, double the estimated requirement for a normal full term baby Even with this added vitamin D, thinning of the skull in the region of the occipito parietal sutures (craniotabes) often exists up to three or four months of age and may increase One or two massive doses of vitamin D by mouth (100 000 i u each) given before the baby leaves hospital,

Vitamin C can be given

is increased every second

re theoretical reasons for

AFTER CARE

Premature babies being nursed in oxygen tents and oxygen incubators will soon reach the stage when they can be taken out this stage is reached when it is found that their colour remains good in a normal atmosphere By this time the oxygen flow is being turned off and the tent opened for increasing periods until the baby

and also provided that infection is prevented, the digestive and assimilati
will be established in a surprising way after 7–10 days Failure to thrive i
be due either to inadequate feedings, or to infection or other organic dise
The use of breast milk is recommended On the day after birth it
given diluted with three parts of water, on the second day half strength, and
third day three-quarter strength In the author's experience there are few healt
mature babies who cannot take undiluted breast milk from the fourth day after
At first quantities are small, but by the fourth or fifth day 2 ounces per pounc
be reached, 2½ ounces per pound by the seventh or eighth day and 3 ounces b
tenth or twelfth day Thereafter a larger intake may prove to be necessary befo

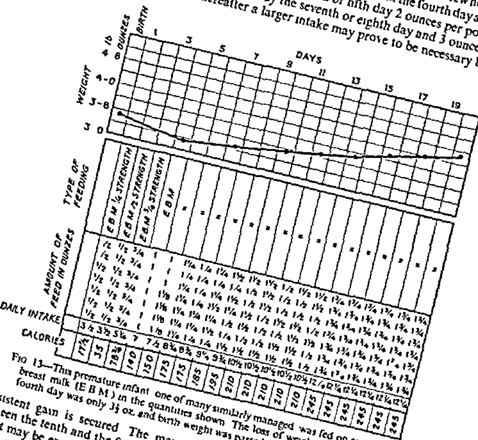


Fig 13—This premature infant one of many similarly managed was fed on expressed breast milk (E B M) in the quantities shown The loss of weight recorded on the fourth day was only 3½ oz. and birth weight was passed on the tenth day

sistent gain is secured The maximum requirement can usually be reached
een the tenth and the fourteenth day, though it may be later in difficult cases,
t may be expected to be between 60 and 80 calories per pound (one ounce of
milk may be taken as 20 calories) If in this way the volume and strength of
ast milk feed is increased steadily, the initial loss of weight which matters
strong infants but may delay the progress of immature ones, is quite small
being less than 4 ounces (Fig 13)

Jorpes J E. Magnusson J H and Wretlind A (1946) *Lancet* 2 228
McNeil C. (1943) *Ed nb n ed J* 50 491

of Premature Infants London H M

Reports on Publ c Health and Med cal Office

NASAL SINUSITIS

The frontal sinuses are variable in their time of appearance and in their development but they are usually present by the third year of life The maxillary antra and ethmoidal air cells are present at birth as well formed cavities and suppura tion in a maxillary antrum is occasionally seen even in the neonatal period These sinuses especially the maxillary antra (Ebbs 1938) are very frequently involved in the respiratory infections of childhood and sinusitis is probably even more common at this age than in adult life but its recognition in childhood is a comparatively

[illegible]

adenoids , and also because of a failure to examine as a routine the whole field of the ear nose and throat clinicians being too often satisfied by merely looking at the throat

THE DIAGNOSIS OF SINUSITIS IN CHILDREN

The so-called adenoid facies is an English conception never accepted on the Continent and now to be regarded as exploded here The facies results from chronic nasal obstruction and is more often caused by intranasal infection and chronic sinusitis than by adenoid obstruction The constant mouth breathing interferes with the proper development of the jaws and teeth (*see* page 548) and with nasal circulation so that there is an increased incidence of nasal and oral infection

Transient acute infection of the sinus membranes occurs in some degree with almost every attack of coryza but this is not of significant importance unless it persists after the attack of coryza is at an end The symptoms of a persisting nasal sinusitis in childhood are cough nasal obstruction mouth breathing and d s charge The voice becomes flat (nasal) because of the obstruction in the nose and loss of resonance in the antra Often a child with such infection looks pallid and off colour and the parents may notice shadowing under the eyes Sinus infection is responsible for a considerable amount of ill health in children particularly during the latter months of the winter There is a close relation between bronchi ectasis and sinusitis nearly all children with bronchiectasis have a complicat ng sinusitis Whether this is cause or effect has not been shown

An examination of the nose reveals discharge draining from the middle meatus or spheno-ethmoid recess The inferior turbinates are often swollen and red Sometimes the child will speak of discharge coming at intervals from the back of his nose and the examination of the throat may show mucus or muco purulent material on the posterior pharyngeal wall An x ray film will usually confirm a diagnosis of sinusitis transillumination is of less value in young patients For a fuller account of sinusitis in children reference may be made to Crooks (1947)

can be moved to a cot. When 4½ pounds is reached the baby can be moved to a cooler room, and can be taken out of doors a few days afterwards.

After the end of the neonatal period premature babies are hardly more susceptible to infection than are others, but from insufficient storage and rapid growth the balance of nutrition and metabolism remains difficult, and specific deficiencies of certain salts may occur. The lack of available iron is an illustration of this and it is wise to give an iron salt prophylactically from the end of the second month until weaning begins, a suitable preparation is Mistura Ferri et Ammonii Citratis pro Infantibus (*N F*), 30 minims, three times daily

PROGNOSIS

Factors Which Influence Survival

The degree of immaturity and the weight at birth have the greatest influence. Crosse (1945b) gave the following figures:

Weight at birth in pounds	*Percentage sent out of hospital weighing over 5 pounds*
0–2	3
2–3	27
3–4	60
4–5	78
5–5½	94

it is necessary to know not only the weight factor but also something regarding the types of cases admitted because adverse factors such as abnormal pregnancy, abnormal labour, chilling and infection before admission affect the issue A

The Ultimate Outlook

mentally, they are apt to advance more slowly and they need special care

Crosse, V. M (1945a) *The Premature Baby* London, Churchill.
— (1945b) Quoted by Ministry of Health (1949)
Henderson, J L (1945) *J Obstet Gynaec. Brit Emp.*, 52, 29.

all neonatal deaths were due to neonatal infection, the majority occurring in the first week of life and affecting in particular the premature and immature infants

TREATMENT

Preventive

Although the remedial treatment of neonatal infection has been greatly improved in the last 5–10 years, more and more emphasis is being laid on its prevention, particularly in neonatal nurseries It is true to say that where a high infection rate has previously obtained in an obstetric department, the introduction of sound neonatal hygiene can reduce this rate to negligible proportions (Farquhar-Murray, Spence and others, 1946) A specific type of enteral infection, acute gastro-enteritis, sometimes occurs in epidemic form among newborn babies in hospitals, and may cause a devastating mortality (70–80 per cent) This and the other types of enteral infection occur chiefly in bottle fed babies and can be prevented by proper organization of the milk preparation room and by strict attention to aseptic nursing technique Much more frequent than enteritis among the neonatal infections are staphylococcal rhinitis, conjunctivitis and infective dermatitis, umbilical sepsis and staphylococcal pneumonia These are conveyed by droplet infection, by the hands of the attendants and the mothers, and by infected instruments, blankets and napkins Prevention depends on aseptic nursing and, above all, on the recognition of any contagious causal lesions, such as acne, styes, whitlows and purulent sinusitis, in mothers, nurses, ward maids and doctors No person with these or similar conditions should be allowed in the neonatal nursery The common virus infections, such as coryza and influenza, are difficult to prevent except by exclusion but masks should be worn by attendants and affected infants should be promptly isolated General responsibility for the hygiene of the nursery should be the duty of one doctor invested with the necessary authority, and the work of the nurses should be supervised by a sister with neonatal training and experience The Report on Neonatal Mortality and Morbidity, published by the Ministry of Health (1949), makes the following detailed recommendations

[illegible] such as thermo

first fourteen days of life

(c) The common changing room and transport trolleys should be abolished Babies should be changed in or beside their own cots Soiled napkins should be dropped into a special container and should not be touched thereafter by any nurse Destructible napkins should be used whenever possible The floors of nurseries should be treated to reduce the risk of dust infection

(d) There should be a nurse s and doctor s gown per cot All in attendance should [illegible]

ng to each baby, and ber gloves, especially during winter

TREATMENT

It is important to make sure that an attack of coryza clears up within a reasonable time If nasal discharge and obstruction continue for three weeks after the onset of coryza steps should be taken to confirm the presence of sinus infection, and if this is found treatment will be required With modern conservative measures the majority of these infections can be overcome, although the practitioner will often need to co-operate closely with a rhinologist Not only does the persistence of subacute infection of the nasal sinuses interfere with health and comfort but it may pave the way to the establishment of a chronic infection Drops containing ½ per cent ephedrine and sulphacetamide or silver proteinate, are instilled into the nose to

be carefully examined for signs of associated infection

The treatment of chronic sinusitis should be carried out under the advice of a rhinologist Its presence usually causes infection and enlargement of the adenoids and the reverse may be true namely, that diseased adenoids may be the cause of unhealthy sinuses, thus, the removal of adenoids will often be necessary in order to break a vicious circle although it should be recognized that this operation may not be sufficient by itself, treatment for the sinusitis being necessary as well

Crooks, J (1947) *Diseases of Children* 4th ed Ed by Paterson and Moncrieff Vol I London Arnold
Ebbs J H (1938) *Brit med J*, 1 385

NEONATAL INFECTION

GENERAL

When newly born, an infant's resistance to many common infections—staphylococcal, pneumococcal streptococcal, *Bacillus coli* and dysenteric—is poorly

and skin infection Staphylococcal infection is common and, in addition to causing *the above diseases, may be responsible for gastro-enteritis, pneumonia, osteitis* or pemphigus neonatorum On the other hand newborn infants are relatively immune to certain virus infections particularly on account of their mothers already having had these infections, but coryza and influenza may affect newborn babies The newborn infant is, in fact an easy prey to common preventable infections which, though often mild, may be severe and fatal An acute infection may indeed be fatal within a few hours of birth Until the introduction of penicillin nearly a quarter of

Additional Measures

The physician's advice is likely to be asked on certain other points

Exercise

The effect of exercise is to increase metabolism and so to reduce weight, but to increase appetite and so to regain it The child should not have its accustomed activities curtailed, but it is not helpful to indulge in excessive physical exercise in the hope of reducing weight

Fluid intake

[illegible]

this effect tends to be transient and these measures can be reserved for the grossly obese child or for one with whom there is some special difficulty over dieting

Drug treatment

Hormone treatment of any kind is unnecessary This includes thyroid treatment, which is still extensively used though disappointing Until a child becomes used to the diet amphetamine sulphate, 5 milligrams twice daily, can be given to take the edge off his appetite This need not be maintained for more than a few weeks The drug is well tolerated by fat children

COMPLICATIONS

Overweight children frequently suffer from the pain of fatigued or strained muscles, flat feet and intertrigo which conditions require appropriate management

PROGNOSIS

It is true to say that by observing a simple discipline in eating, any fat child may be reduced considerably in weight and kept thinner as long as the dietary rules are followed There is no means, however, of correcting the metabolic fault leading to fatness in those so predisposed, and therefore dieting must become a part of the life of such people, as do insulin injections with a diabetic patient Fat people will not convert to thin people, and if this is attempted they become languid and indisposed *One should try to bring the fat child within the upper limit of normal weight for his age, but not lower*

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Marriott, H L (1949) *Diet Card* London, Lewis

OXYGEN TENTS—USE OF

METHODS OF ADMINISTRATION OF OXYGEN

Oxygen has been used in the treatment of anoxia for about half a century Originally it was given by means of a glass funnel held in front of the mouth but this method was wasteful and inadequate Later it was improved by using a nasal

(f) All doors should be swing doors without handles taps should be of the foot lever type to avoid use of the hands

(g) Routine throat swabbing of the staff and ward maids would reveal carriers pathogenic organisms, such as coagulase-positive *Staphylococcus aureus*

(h) Routine bacteriological examination of all mothers on admission would b desirable, any showing virulent *Staph aureus* or other pathogenic organisms shoul be isolated until clear of these organisms

(i) Visitors, who are liable to introduce infection should be strongly discouraged husbands only should be allowed admittance except in special circumstances

(j) Infants who show any infective condition, however slight or who are suffering from any undiagnosed condition, should be isolated immediately

(k) The desirability or otherwise of separating mother and infant when either has an infective or undiagnosed illness depends upon individual circumstances Separation is not always necessary, particularly when it is the baby who is infected Mothers of in fants with superficial staphylococcal infections run an increased risk of mastitis, but this is a small risk and may be ignored On the other hand the development of frank infection in the mother may be an indication for removing the baby from her Babies should not be admitted with their mothers to puerperal sepsis blocks

(l) Propaganda about infection and its dangers should be intensified and maintained. An 'infection-conscious" outlook should be fostered by lecturers sisters and staff nurses and the junior nurses should be given lecture demonstrations by the clinical and laboratory medical staff

REMEDIAL

When a newborn baby is found to have an infection it should be removed immediately from a communal nursery to an isolation room The treatment of rhinitis conjunctivitis pyodermia and umbilical infection should not be started, at any rate in hospital infants until swabs have been taken for bacteriological examination, and this is because a knowledge of the bacterial cause is necessary more particularly if the infection should be spread to other patients The bacteriologist should be asked to identify the bacterial cause and to ascertain its sensitivity to penicillin and the sulphonamides As soon as the swabs have been taken from the infant, treatment should be instituted without waiting for the bacteriological report.

Umbilical Infection

Mild umbilical infection can be treated with a suitable antiseptic dressing or with penicillin powder If the baby seems at all ill or if the infection is purulent in type, then systemic penicillin should be given

Urinary Infection

The possibility of urinary infection in the neonatal period must be remembered nd a specimen of urine examined Once recognized this condition is usually nenable to treatment.

aphylococcal skin infection

This can be treated locally with penicillin cream or with certain non irritating mical antiseptics, and sodium ethylmercurithiosalicylate, in the form of Merthiocream, 1 1 000, is a satisfactory agent for the purpose In addition to the local tment, penicillin may be given parenterally, in the less severe infections the oral

Additional Measures

The physician's advice is likely to be asked on certain other points

Exercise

The effect of exercise is to increase metabolism and so to reduce weight, but to increase appetite and so to regain it The child should not have its accustomed activities curtailed, but it is not helpful to indulge in excessive physical exercise in the hope of reducing weight

Fluid intake

Much of the extra weight of the fat child consists of water and so either fluid in- [illegible]

[illegible]

this effect tends to be transient and these measures can be reserved for the grossly obese child or for one with whom there is some special difficulty over dieting

Drug treatment

Hormone treatment of any kind is unnecessary This includes thyroid treatment, which is still extensively used though disappointing Until a child becomes used to the diet amphetamine sulphate, 5 milligrams twice daily, can be given to take the edge off his appetite This need not be maintained for more than a few weeks The drug is well tolerated by fat children

COMPLICATIONS

Overweight children frequently suffer from the pain of fatigued or strained muscles, flat feet and intertrigo which conditions require appropriate management

PROGNOSIS

It is true to say that by observing a simple discipline in eating, any fat child may be reduced considerably in weight and kept thinner as long as the dietary rules are followed There is no means, however, of correcting the metabolic fault leading to fatness in those so predisposed, and therefore dieting must become a part of the life of such people, as do insulin injections with a diabetic patient Fat people will not convert to thin people, and if this is attempted they become languid and indisposed One should try to bring the fat child within the upper limit of normal weight for his age, but not lower

MALCOLM MacGREGOR
REGINALD LIGHTWOOD

Marriott, H L (1949) *Diet Card* London, Lewis

OXYGEN TENTS—USE OF

METHODS OF ADMINISTRATION OF OXYGEN

Oxygen has been used in the treatment of anoxia for about half a century Originally it was given by means of a glass funnel held in front of the mouth but this method was wasteful and inadequate Later it was improved by using a nasal

catheter, especially for young children with pneumonia which, though it permitted continuous administration, still afforded no possibility of regulating the percentage

convenient way of giving oxygen to a dyspnoeic patient It may be noted that an oxygen inhaler is less suitable for a child, because a small patient does not tolerate a face-piece, and therefore oxygen tents are generally used in paediatrics

PRINCIPLES OF OXYGEN THERAPY

also the blood itself and pulmonary circulation are adequate Interference with oxygen utilization results in depressed function in the nervous, muscular and glandular systems according to the degree of anoxia (or oxygen lack) Acute anoxia shows itself in dyspnoea, cyanosis, tachycardia, slight fever, disorientation, delirium and finally collapse When there is dyspnoea from respiratory or circula-

INDICATIONS

anoxia) in which, if pulmonary respiration is affected, it is a secondary phenomenon.

CHOICE OF APPARATUS

Cyanosis in the Newborn

In

in ne

is po

inspected and quickly reached, but during procedures such as feeding and changing it is necessary to raise the lid of the tent and then the oxygen concentration disappears The attendant must closely watch the temperature inside the tent

and an hourly temperature record kept on a chart By using warm water bottles the temperature inside the tent can be adjusted The apparatus (obtainable from Oxygenaire, Ltd) can be fitted into any type of cot

Oxygen tents are also made in Perspex, either as a total cover for a baby, corresponding in principle to the " Queen Charlotte" infant tent, or as a bell type, covering only the head and shoulders and having a skirt attached to the opening to minimize loss of oxygen (Komrower, 1949)

PREMATURITY

The " Queen Charlotte" infant tent was not designed as an incubator for premature babies but, in the absence so far of anything more suitable, it can be used as an incubator by adjusting the temperature as needed Many small and delicate premature babies are successfully nursed in this type of oxygen tent (*see* Immature and Premature Infants—Care of, page 465)

Oxygen incubators of special design, that is, provided with automatic humidity and thermostatic controls, are used in the United States of America, Canada, Sweden and elsewhere but not yet in Great Britain because they have not been available In a modern incubator the premature infant is usually nursed without clothing and all ordinary procedures can be performed without interference with the concentration of oxygen inside the incubator

The Aga Incubator (Fig 15), manufactured in Stockholm, is of relatively simple design and is becoming a standard item of equipment in Swedish paediatric departments

In this incubator the premature baby lies in a box which is covered over with a semi-cylindrical, movable, plastic hood The oxygen concentration can be varied *according to requirements between 20 and 60 per cent and the humidity is con*trolled The radiant heating source is a special electric lamp which hangs over the centre of the hood, it emits chiefly red and infra red rays and the heating effect *is thermostatically controlled The temperature so maintained is such that the* ... movement and nursing ric current and oxygen *automatically sounded*

(Fig 15)

The development of incubators for premature infants has made further progress in the *United States of America where a choice of apparatus, incorporating ther-*

The "Isolette" (Fig 16) *gives a close stabilization of temperature,* ... and as in the Davidson apparatus the infant is completely ... ncubator and so there

The Gordon-Armstrong Incubator

these advantages and it, too, is man...

The *heating is thermostatic, oxygen is supplied and the atmosphere is moistened.*

[illegible]

convenient way of giving oxygen to a dyspnoeic patient It may be noted that an oxygen inhaler is less suitable for a child, because a small patient does not tolerate a face-piece, and therefore oxygen tents are generally used in paediatrics

PRINCIPLES OF OXYGEN THERAPY

The aim of oxygen therapy is to assist the function of respiration when it becomes [illegible]

also the blood itself and pulmonary circulation are adequate Interference with oxygen utilization results in depressed function in the nervous, muscular and glandular systems according to the degree of anoxia (or oxygen lack) Acute anoxia shows itself in dyspnoea, cyanosis, tachycardia, slight fever, disorientation, delirium and finally collapse When there is dyspnoea from respiratory or circula- [illegible]

INDICATIONS

[illegible] interference with the lungs and respiration is more likely to be improved by oxygen than conditions of the blood ("anaemic" anoxia), and the circulation ("stagnant" anoxia) in which, if pulmonary respiration is affected, it is a secondary phenomenon

CHOICE OF APPARATUS

Cyanosis in the Newborn

In paediatric work, oxygen tents are often required for the treatment of cyanosis in newborn infants In Great Britain, the "Queen Charlotte" Infant Tent (Fig 14) is popular because it is easy to handle, not bulky, and the infant can be readily inspected and quickly reached, but during procedures such as feeding and changing it is necessary to raise the lid of the tent and then the oxygen concentration disappears The attendant must closely watch the temperature inside the tent

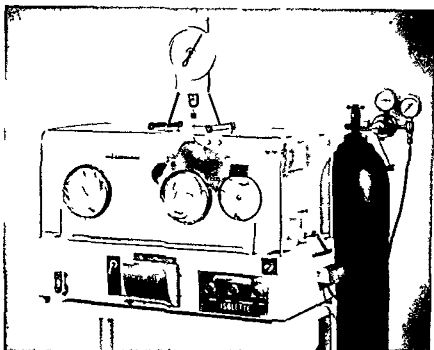


FIG 16 — Isolette Infant Incubator Weighing a premature baby in the incubator Thermostatic heating humidity control and ventilation with filtered fresh outside air is provided

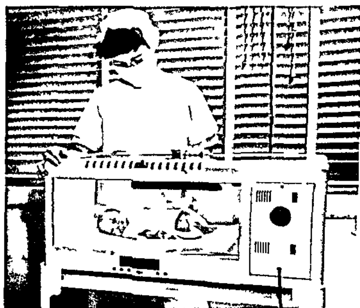


FIG 17 —The Gordon Armstrong Incubator

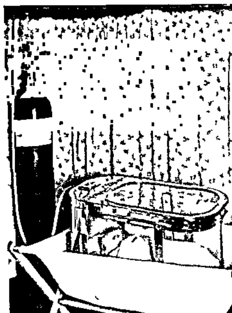


FIG 14 —The "Queen Charlotte' Infant Tent Note the easy reading thermometer which the nurse has hung on the inside wall of the tent

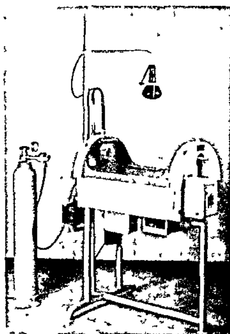


FIG 15 —The Aga Incubator This apparatus is designed for premature infants but can be used for infants up to about 3 months The heating is by a thermostatically controlled lamp, seen above. The incubator is easily opened when the infant requires attention (*By courtesy Messrs Svenska Aktiebolaget Gasaccumulator*)

the air Special masks have been introduced for aerosol therapy in adults and these are suitable for older children but they may not be tolerated by an ill child and are unsuitable for an infant Under these circumstances one of the oxygen tents already described offers a satisfactory solution, either the "Queen Charlotte" Infant Tent (Fig 14) or the "Wigmore Junior" Tent (Fig 18) Aerosol penicillin is used in the treatment of pulmonary infection including bronchitis, broncho-pneumonia, and pre-operatively in bronchiectasis With an oxygen flow of 3 litres, 100,000 units are delivered in one hour, and a faster flow gives a more rapid dosage Approximately 25–40 per cent of the penicillin is absorbed into the blood stream from the respiratory tract and the alveoli, and can be recovered from the urine within 12 hours A satisfactory content of penicillin can be obtained in the blood in this manner Streptomycin can be administered in the same way

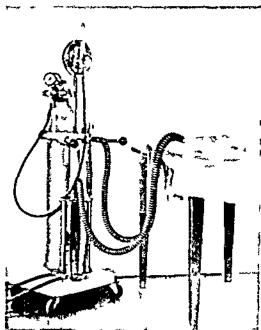


Fig 19—The Aga Oxynator This apparatus is designed for oxygen treatment in infants under 3 months and in children under 12 years of age The plastic sheet is tucked under the child Controlled by a flow meter, oxygen-air mixture is injected into the hood and there is a conditioner for regulation of the carbon dioxide percentage, and this also acts as a cooler and dehumidifier The consumption of oxygen is about 3 litres per minute and at this rate a cylinder would last about 8 hours *By courtesy, Messrs Svenska Aktiebolaget Gasaccumulator*)

Plastic hood apparatus

By using a specially designed transparent plastic hood and sheet an oxygen tent can be dispensed with for purposes of oxygen and aerosol treatment This principle is followed in the design of Perspex hoods made in England and in the Aga Oxynator (Fig 19) coming into production in Sweden

OXYGEN INHALATION APPARATUS (B L B TYPE)

Such apparatus can be used in children for the same indications as in adults if certain limitations are observed Except when there has been an opportunity to practise with the mask before it is needed it can only be used in the case of older

The incubator has a hinged lid which must be opened to give attention to the infant since there are no sleeves to admit the hands of the attendant the sleeves on other

be about 90° F (moist) and the outside temperature should be 90° F (dry)

OLDER INFANTS AND CHILDREN

The apparatus previously described is primarily intended for premature babies, although it can be used for the treatment of pneumonia and other conditions in infants up to about 3 months of age After that age a larger type of tent is required,

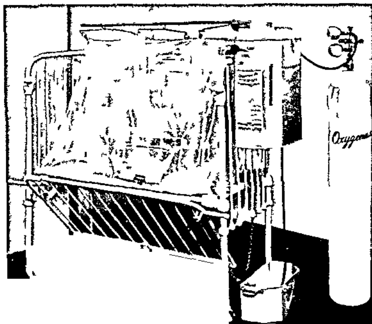


FIG 18—The 'Wigmore Junior' Tent The canopy is made of rubberized fabric or transparent plastic material The apparatus is portable and easy to handle A constant flow of 4½ litres will give a concentration of 50 per cent oxygen without build up of carbon dioxide There is an ice-container for cooling purposes

in Great Britain the 'Wigmore Junior' Tent (Fig 18) has been the standard model serving this purpose The 'Wigmore Junior' tent (obtainable from Oxygenaire, Ltd) is designed to fit an ordinary hospital cot and it can also be used in a private house

AEROSOL THERAPY

Agents such as penicillin and streptomycin can be administered by inhalation in aerosol form an aerosol being a mist composed of minute particles suspended in

REMEDIAL

Dietary

A low-fat diet is given, with at least twice the normal requirement of protein In addition, casein hydrolysate is given in a dosage of 2 grammes per kilogram of body-weight daily A high carbohydrate intake is usually well tolerated by these infants Vitamins A and D should be given orally in about three times the normal dosage, and the concentrated preparations are the most suitable Extra vitamin B and vitamin C are also advisable

Enzymic

[illegible]

Chemotherapy for respiratory infection

Much can sometimes be done to improve these patients by overcoming acute or chronic respiratory infection The bacteriology of the infection is the guide to the right treatment a laryngeal swab should be taken in an infant, and the sputum examined in a child Treatment can then be given in the form of a sulphonamide, penicillin or streptomycin Aerosol therapy with penicillin may be valuable

AFTER-TREATMENT

After-treatment consists in the continuation of the above dietary and enzymic treatment, and the child's life should be regulated in accordance with the severity of the symptoms and the age It is possible for patients who are making good progress to attend school

PROGNOSIS

Andersen (1938) claims good results when dietary and enzymic treatment are commenced early in life The outlook depends in great part on the condition of the lungs, and the aim should be to control respiratory infection and to ensure sufficient food, especially protein to keep the child in nitrogen balance and allow normal growth Cystic fibrosis has not yet been studied long enough for its prognosis to be properly judged

Andersen, Dorothy H. (1938) Amer. J. Dis. Child, 56 344
[illegible]

PINK DISEASE

INTRODUCTION

Pink disease is a severe disturbance of the autonomic nervous system It has an [illegible]

administration

PRECAUTIONS AGAINST FIRE

Crosse, V M (1949) Personal communication.
Komrower, G M (1949) *Brit med J*, **1**, 953

PANCREAS—FIBROCYSTIC DISEASE OF

Although the association of steatorrhoea with pancreatic disease has been recognized for more than a century, the nature of the changes in the pancreas has only been known for about 35 years, and our present knowledge of cystic fibrosis is mainly due to the work of Dorothy Andersen (1938) and the more recent pathological studies by Farber (1942, 1944) and Bodian (1946) The name, cystic fibrosis of the pancreas, is itself rather a misnomer since fibrosis and cyst formation are not invariable and other viscera may be affected The histological changes have been found in the pancreas in about 3 per cent of necropsies in infants

In the neonatal period the disease may show itself as (a) meconium ileus, but this clinical presentation is less common than the other symptoms which may be grouped as follows (b) nutritional defects due to failure of all the exocrine secretions of the pancreas, that is, amylase, lipase and trypsin, and (c) respiratory symptoms due to the absence of normal mucus secretion in the bronchial tree, resulting in cough and subsequent infection At first the cough is dry and unproductive, but sooner or later bronchiectasis is likely to occur

TREATMENT

PREVENTIVE

isolated examples occur

fear he will be spoiled In sickness a certain amount of spoiling is unavoidable and *rules against it must be put aside He will need to be soothed when he cries and if* the mother becomes worn out she will need help, and a relative or neighbour should be asked to relieve her The patient should be wheeled out of doors as much as possible If there is photophobia the hood of the pram should be up or the pram may be draped with dark net Contact with infection should be avoided for example, whooping-cough may tip the scales against recovery

Feeding

Severe anorexia is almost constant, and wasting results The patient should be

diet may be offered and, if necessary, ice-cream may be tried The patient must be given protective foods and vitamin foods, such as orange or other fruit juices

was a great increase in beri beri and pellagra among children in Hong Kong, but pink disease did not occur

Care of the skin

weather affected children have been seen to hold their hands in cold water to

cause it is common, prompt treatment is necessary should infection occur

Rest and sleep

Until convalescence is established these patients should remain at rest They are apathetic but they often sleep badly Attention must be paid to all the details mentioned in the preceding paragraph only then should sedatives be considered and they must be used wisely Phenobarbitone is the most suitable because of its prolonged action It need not be given every night The author often prescribes phenobarbitone, ¼–½ grain (16–32 milligrams) according to age, to be given at night for three nights in succession, and after a night or two it may be given again The mother herself may need a sleeping aid, in which case Amytal is suitable because its action is shorter and she will wake refreshed in the morning

COMPLICATIONS

to this fact the
kept
oss of

moderate increase in cells and protein, but these changes probably soon disappear. *There is no evidence that the condition is caused by specific or other dietary*

interesting view It would be useful to correlate the incidence of pink disease in different countries with the extent of the use of mercury for children In Great *Britain it is often given to teething infants in the form of Steedman's Powders, and*

sub judice.

from the pink and swollen extremities, but it should be known that some patients have the constitutional symptoms without changes in the hands and feet.

TREATMENT

There is neither a preventive nor a curative treatment for the condition and the disease must run its course, which is usually not less than eight weeks, and may last more than six months

REMEDIAL

Explanation

At first the mother will be in despair because of the apparently inexplicable misery and wasting but parental anxiety will be considerably relieved when a

previously were almost beyond her.

Post-operative care

Some paediatricians favour a slow increase in the size and strength of feeds because they fear the onset of diarrhoea from food intolerance if less cautious methods are followed Others believe that post-operative diarrhoea, which used to account for the greater number of the post-operative deaths, was not so much due to the rapid feeding of a starved baby as to its infection by intestinal or parenteral pathogens, and that a fairly rapid increase in the quantities taken is advantageous except when infection occurs

Examples of Slower and Faster Post-operative Feeding Schedules
(to be modified to suit individual babies)

Rapid schedule (operation 10 a m)

2 p.m	[illegible]
3 p m	[illegible]
4 p m	[illegible]
5 p m	[illegible]
6 p m, 8 p m	1½ fl oz. of half-strength normal feed
10 p m	2 fl oz. of three-quarter-strength normal feed
12 p m	2 fl oz. of full strength normal feed
6 a m	Three-hourly normal feeds, six times a day

Slow schedule (operation 10 a.m)

First day

2 p m	Half-strength normal saline solution with 5 per cent glucose, 120 minims hourly for 4 hours
6 p m	[illegible]
8 p m	[illegible]
11 p m	[illegible] ds

Second day

6 a m	Full strength normal feed, 360 minims 2 hourly for 2 feeds, followed by 1 fl oz 2 hourly for 3 feeds
4 p m	[illegible] 2 hourly feeds of 2 oz

MEDICAL TREATMENT

Spontaneous recovery occurs in congenital pyloric stenosis about the third month, provided that the infant does not die from starvation, alkalosis or inter- [illegible] which without treat- [illegible] ially [illegible] has shown that expectant treatment (with little or no active treat[illegible]) [illegible] high percentage of recoveries provided cross-infection was prevented, but this line of [illegible] treatment it was a [illegible]

teeth may occur even without obvious stomatitis The teeth may be found in the patient s bed or discovered in the stools Stomatitis occurs in severe cases and necrosis of the jaw may occur multiple osteomyelitis may ensue To avoid such complications the mouth should be kept clean and penicillin should be given parenterally unt l the stomatitis subsides Occasionally scratching of the hands

AFTER TREATMENT

After a varying period the climax of the disease is gradually passed The first

of vitamin D The hypotonicity of the muscles disappears with resumption of active movements and physiotherapy is seldom required

Relapses

In a few patients the symptoms return after improvement has begun Such a relapse is likely to be of shorter duration and of less severity than the initial attack

REGINALD LIGHTWOOD

Warkany J and Hubbard D M (1948) *Lancet* 1 829

PURPURA—POST-INFECTIVE

Post infective purpura (anaphylactoid purpura Schonlein Henoch syndrome) principally affects children under 14 years of age and manifests itself in three ways

nephritis makes the illness rather serious Moreover it is sometimes associated with juvenile rheumatism

The abdominal symptoms may resemble some acute abdominal catastrophe such as intussusception If the typical exanthem is present it is probable that the gastro-intestinal symptoms are of the same origin and surgery is contra indicated However it must be remembered that a true intussusception sometimes develops at the site of a submucous haemorrhage in the intestine therefore the diagnosis should be most carefully considered and if the acute symptoms do not subside rapidly the need for surgery should be reviewed

TREATMENT

PREVENTIVE

There is no preventive treatment except to deal properly with primary streptococcal infections

Scopolamine —Skopyl (methyl scopolamine nitrate 2 5 milligrams, diluted spirit to 1 millilitre) is a Swedish preparation which is stated to be even less toxic than Eumydrin A total of three drops per day is given at the beginning, and is increased as necessary to a maximum of 6–8 drops per day

Some cases do not respond to the above anti spasmodic drugs in the doses recom mended, and since unsuccessful medical treatment may jeopardize the surgical result, the decision to perform a Rammstedt operation must not be delayed if the patient is obviously losing ground The ideal plan is to select for medical treatment only those who may be expected to respond to it Patients who do respond will require its continuation for a month or more, as otherwise the symptoms may recur after withdrawal

Gastric lavage

When there is evidence of gastritis, which is suggested by the presence of much mucus and altered blood in the vomit, it is of value to wash out the stomach with saline solution (not sodium bicarbonate)

Withdrawal of gastric residue

The removal of the residue in the stomach before feeds, and its measurement, is a procedure of diagnostic value in cases of pyloric stenosis, in such cases it is found that the volume of the aspirate is likely to be greater than that of the last feed This aspiration before feeds is also of therapeutic value as it allows the depleted tone of the dilated stomach to recover and gastritis to subside Such aspiration may be continued for a few days until the fluid obtained is clean and small in amount In so far as regular aspiration usually stops vomiting it may, if the aspirate is a large one, give a feeling of false security, and so the volume aspirated should be added to any calculation of the total vomitus During anti spasmodic treatment which is proving successful it is found that the volume aspirated rapidly falls and the bowel action becomes normal

PROGNOSIS

With the best hospital technique and background, medical and surgical treatment are each attended with a very small mortality In Great Britain the results of medical treatment have not equalled those from surgery, but in Scandinavia the reverse is true In either case a mortality rate of between 1 and 5 per cent is quoted With very few exceptions the late results are always good

Ladd, W E and Gross R E (1941) *Abdominal Surgery of Infancy and Childhood* Phila delphia Saunders

RHEUMATIC CHOREA (SYDENHAM'S CHOREA)

Since chorea is one of the manifestations of "acute rheumatism' its treatment forms an integral part of the latter and the same principles apply (*see* page 1103) The main desiderata are as follows

(1) To provide physical rest in suitable surroundings until the rheumatic infec- tion has subsided

by more effective and less toxic derivatives of atropine and scopolamine These have been used by paediatricians in Denmark and the Scandinavian countries with good results although great attention to detail and a high standard of aseptic nursing technique has continued to be necessary for success

Feeding

Dehydration and electrolyte disturbances

Except in the milder cases dehydration is likely to be present, and when it is severe there is a fall in the chloride content of the blood and tissue fluids together with alkalosis Recovery is endangered unless these changes are recognized and corrected by the intravenous administration of normal saline solution and 5 per cent glucose In cases of less severe degree, normal saline solution may be given by the subcutaneous or intramuscular route, using the continuous drip technique

Drugs

Methyl atropine nitrate (Eumydrin) —Eumydrin is stated to be fifty times less poisonous than atropine sulphate and can be used in fairly large doses Some patients respond more readily than others and the larger doses are required for the latter It is dangerous to commence the treatment until dehydration has been overcome Methyl atropine nitrate is given in three ways

(a) As an aqueous solution of Eumydrin in a strength of 1 10,000, which must be freshly dispensed each week because it is unstable in solution The commencing dose is 3 millilitres by mouth 20–30 minutes before feeds This dose should be increased day by day until the vomiting is checked or the first signs of intolerance appear that is flushing of the face and fever A total of 30 millilitres per day is seldom exceeded

workers prefer to start with a large dose in order to control the vomiting as soon as possible, and the number of lamellae given before each feed is then reduced until a

Drugs

In the history of chorea many remedies have been suggested, taken up wi enthusiasm, then abandoned and forgotten, arsenic, which is quite useless, is example As there is no specific remedy drug treatment is of secondary importanc It is difficult to determine the value of any remedy because most attacks begin subside of their own accord about the third or fourth week Sodium salicylate ar aspirin are often given on general principles but not for any specific effect on tl chorea Opiates should be avoided Sedative drugs are often given in the acute stag and may be of more value in cases in which movements persist With barbiturate such as soluble phenobarbitone, ¼ grain, twice daily, or Sodium Amytal, ½–¾ grai two or three times a day, the movements often seem to die down Bromide is le effective

Re-education

When the acute (organic) stage is over there may remain a habit of persisten choreic movement (functional stage) which is best treated by re-education of th muscles and the provision of occupation, barbiturates may also be useful Schoolin and occupational therapy should be provided at this stage for such patients i hospital

CHOREA GRAVIS

In this type of disease violent chorea is seen with considerable fever and toxic disturbance With lack of sleep there may be profound exhaustion and deaths have been recorded in such cases The patient must be protected from injury and, when necessary, fluids are given by a nasal or oesophageal tube If the patient is able to take preparations by mouth, chloral may be given, or Amytal, 1½ grains—alternatively paraldehyde is valuable, and may be given by deep intramuscular injection ½–1 millilitre per stone of body weight, repeated if necessary after 8 hours Good results are sometimes obtained by applying a hot wet pack, or by prolonged sedative warm bathing

PERSISTENT CHOREA

In some cases the movements may continue week after week and it is difficult to find a remedy Before ordering energetic treatment it is well to be satisfied that the persistence of movement is not merely a functional habit The following have sometimes appeared to be successful

(a) Sedative drugs such as phenobarbitone, or Chloretone, 0 3 gramme three times a day for a child of 10 years for 48–72 hours, followed by 0 3 gramme once daily for 10 days

(b) When sedative drugs fail, fever therapy (Sutton and Dodge, 1938) may be tried, intravenous T A B vaccine is the most convenient, or radiant heat, hot packs and diathermy, may be applied to keep the body temperature at 104° F for 4–5 hours, three times a week (this treatment is contra indicated when active carditis is present) Nirvanol has been abandoned as a means of producing therapeutic pyrexia

(c) Prolonged warm hydrotherapy

(d) Removal of tonsils but only if they are definitely infected

(2) To provide mental rest in the initial stage and occupation during the recovery stage

(3) To protect the patient from streptococcal cross infection which is so apt to be followed by a "rheumatic relapse"

The differential diagnosis of chorea from habit spasm is extremely important, because, whereas the treatment of the former is with rest in bed, treatment in bed is contra-indicated in the latter and the patient will usually benefit from continuing in school

TREATMENT

PREVENTIVE

The underlying principles do not differ from those for acute rheumatism, a

CURATIVE

In treating a patient with chorea of average severity we should remember that it is a self limited condition in which most of those affected recover spontaneously within 3–10 weeks so that no drastic treatment is necessary, and in any case there is no specific remedy

Régime

The child should be removed from its home, if this is of a poor economic type, to be nursed in a dry, warm and airy room or hospital In the majority of cases hospital treatment is to be preferred Since emotional disturbances are common the child should be looked after by sympathetic attendants Confinement to bed is necessary until the disease is thought to be no longer active, that is until the choreic movements have gone the pulse rate is normal and all other manifestations of rheumatism are quiescent This indication for rest in bed is both on account of the chorea and also because chorea has the same cardiac implication as rheumatism itself It is commonly advised that the child should lie flat in bed with only one small pillow, but the author prefers that he or she should recline in the most comfortable position with the head raised so that it is possible to see what other people are doing and to look out of the window without exertion If the movements are violent the sides of the cot should be padded Feeds should be given by a nurse using a feeding cup, and all unnecessary exertion should be avoided over the toilet The period of rest in bed is seldom less than a month and it may be 2 or 3 months *Towards the end of this period the patient will be allowed to move freely* in bed and massage can be given, by this time he or she should be occupied with reading, handicraft and lessons

Diet

This should be nourishing and varied, tea, coffee and other stimulants are best avoided

admission to hospital should be omitted There is no need to fix the napkin it is better placed flat beneath the buttocks and the legs protected with a cradle The infant should be taken off the scorbutic diet

COMPLICATIONS

Scurvy is not infrequently complicated by infections such as bronchitis, pneumonia, otitis media and urinary tract infection These should be remembered and appropriate treatment prescribed When scurvy was a common disease in Great Britain rickets was also associated with it, but now scurvy tends to be encountered particularly in infants receiving every care and the association with rickets has become unusual

AFTER TREATMENT

No after treatment is required and second attacks of scurvy are unknown in infants A large subperiosteal haematoma, usually at the lower end of the femur, may sometimes persist for a time It will resolve spontaneously and should be left alone

REGINALD LIGHTWOOD

STILL'S DISEASE

DEFINITION AND RECOGNITION

[illegible] ...matoid arthritis in [illegible]

time of onset is in the pre-school age and the younger it starts the greater the risk to life The disease may begin suddenly with joint symptoms or perhaps after an insidious start it may pursue a nondescript pyrexial course before signs of polyarticular involvement appear The swelling of the joints is fusiform with wasting above and below them In the earlier stages the changes are peri articular, but in severe cases degeneration and absorption of the articular cartilage ensues The [illegible] ...ing to the affected joints is... ally enlarge and also the spleen in [illegible] ...ay the enlarge [illegible] ...nally the onset is with pericarditis with or without pleural and pulmonary lesions but more often the pericarditis is silent and generally remains undetected except at necropsy

TREATMENT

PREVENTIVE

As the cause of the disease is unknown no certain preventive treatment is available Good nutrition and the protection of the child from debilitating circumstances, including emotional stress, are indicated

REMEDIAL

Acute stage

In the acute stage, while the joints are swollen and painful, the child will be confined to bed If large joints are affected the limb is usually splinted in a suitable

PROGNOSIS

With no treatment other than rest the large majority of patients will recover

brain Card tis is the chief danger in chorea and its incidence increases with the number of recurrences

REGINALD LIGHTWOOD

Sutton L P and Dodge K G (1938) *J Pediat* 12 490

RICKETS

DEFINITION

Rickets is a deficiency d sease due to imperfect retention of calcium and phos phorus during the period of skeletal growth It is ch efly a disorder of the early months of life arising when there is insuffic ent vitamin D in the diet to meet metabolic requirements

RECOGNITION

In diagnosis certa n physical signs which are really its after-effects upon the skeleton attract undue attention In its active phase the common type of mild rickets seen today affects muscle tone and the solidity of the skull along the cranial sutures (craniotabes) and also delays closure of the anterior fontanelle beyond the

greatest number of cases but rickets may be seen at other periods of vigorous growth for example in the phase of recovery from coel ac disease

TREATMENT

PREVENTIVE

provision for both these needs at small cost Breast feeding imparts some protec-

per ods W th regard to diet cereals are calcium-depleting (rachitogeni) and

Vitamin D—Vitamin D therapy in high dosage has been employed Ford (1945) states that he had encouraging results using 200 000 units of vitamin D_2 daily by mouth This is a larger dose than is usual and Paterson (1947) mentions the smaller one of 100 000 units With this treatment there is a possibility of intoxication (hypervitaminosis D) and so it is necessary to check the level of calcium and urea in the blood regularly and to watch the urine for albumin and the urinary sediment for casts Anorexia lassitude constipation and loss of weight are the clinical symptoms of hypercalcaemia (Harris 1932 Brimblecombe 1949)

Penicillin—Penicillin and other antibiotics are without value in Still s disease

Antihistamine—The antihistamine drugs have not been shown to benefit the condition

Iron—Some degree of anaemia is common in Still s disease and iron preparations are required both for prevention and treatment

Analgesics and sedatives—In some cases the pain of Still s disease is not severe but in others the child is rendered miserable and will be particularly apprehensive of being handled Analgesics for the relief of pain and sedatives for sleep will then be necessary Tablets of aspirin or compound tablets of codeine are valuable analgesics while phenobarbitone ½ grain or Carbrital half a capsule are useful sedatives

ACTH and cortisone—The treatment of Still s disease will be greatly modified at a future date by the use of ACTH and cortisone (*see* page 1108)

NON MEDICINAL METHODS

Many non medicinal methods of treatment are employed

Blood transfusion—When the feverish phase persists and the patient is going downhill and particularly in the face of severe anaemia a blood transfusion should be given

Induced fever—From time to time it has been found that the activity of Still s

followed the hepatitis Unfortunately rheumatoid arthritis is usually quite ui influenced by such means and it is safer and easier to induce fever with T A B or by physical agents but again the results are likely to be disappointing

Vaccines—The value of any type of vaccine has never been proved and the effects if any are probably non specific It should be emphasized that the causation of Still s disease is not known and vaccine treatment is therefore empirical

activity helps to preserve the muscles from wasting Diathermy may give symptomatic relief No other local treatment for the joints is advisable in the acute stage

Gate)

MEDICINAL

The fluctuating course of Still s disease with its exacerbations and remissions has trapped many unwary observers into making premature claims for various treatments and it is unwise to accept any remedy until its value has been established by the study of a large series of cases followed over a long period with an equal number of controls If present evidence such as it is is examined we find that no treatment so far devised drug vaccine serum or otherwise is actually curative Whether cortisone will prove to be a permanent cure remains to be shown its immediate effects are remarkable

Salicylate therapy —This is beneficial in some cases It brings about a fall in temperature reduces pain improves sleep and so makes for subjective improvement but there is no corresponding amelioration in the arthritis Curiously enough sodium salicylate will sometimes lower temperature over one period of the illness and fail to do so in another To be effective the drug must be given in sufficient quantity because its effects are roughly in proportion to the level of salicylate

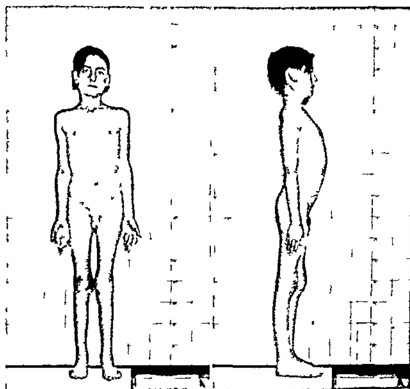


Fig 21 —Same case as Fig 20 July 1949 Patent has straight legs, full movement of knees and ankles and can walk well

applied gradually and cautiously, especially any form of manipulation Complete immobilization in plaster for more than one or two days at a time is best avoided if possible

Psychological Considerations

In a chronic debilitating disease a child may easily become fussy and intro-

considerable encouragement during set backs In hospital, variety of occupation should be provided and change of scene wherever possible Visiting by the parents almost always helps both parties and should be encouraged

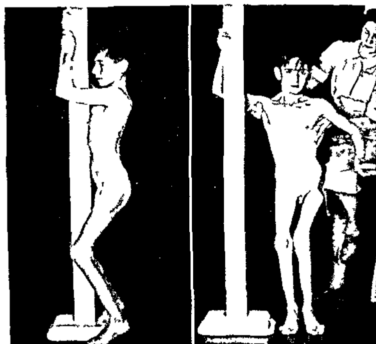


Fig 20—Still's disease R H aged 12 years showing flexion of knees and foot drop July 1948

Treatment in Later Stages

As the pain swelling and tenderness pass off more vigorous treatment becomes possible It is not necessary or wise to wait for complete quiescence with a normal sedimentation rate before allowing the patient out of bed and contrary to the author's previous expectation early mobilization is beneficial Active and passive

the diagnosis A diagnostic lumbar puncture should be performed at the same time Under normal circumstances only a few drops of clear, colourless fluid can be obtained from the subdural space When there is a haematoma the contents vary in early cases from blood to blood stained fluid and, later, as resorption of the clot takes place, there remains a xanthochromic fluid with a high protein content The older the haematoma the more likely is it to be walled off by a fibrinous mem brane, and when a sac is so formed the quantity of fluid it contains may increase by osmosis and without further bleeding The symptoms will then be progressive The question of dealing with the membranous sac governs the treatment

TREATMENT

Unlike the similar condition in adults, simple evacuation is not sufficient because the presence of a restricting membrane interferes with the subsequent growth of the brain, and treatment should be carried out under the supervision of a neurosurgeon in the following three stages

(1) Gradual release of pressure by repeated subdural taps during a period of from one to two weeks During this stage attention is given to the general condition of the infant, so that dehydration or infection may be overcome, anaemia treated

latter is found in about two thirds of the cases and needs to be removed

(3) The third stage consists in raising a bone flap to expose and remove the blood clot or membrane, if either has been found during the previous operation This is important because the normal rapid growth of the infantile cortex is easily inhibited by any restricting tissue and cortical atrophy results, leaving the infant mentally deficient or suffering from cerebral palsy

See also Birth Injuries

THRUSH

DEFINITION AND RECOGNITION

Thrush is an infection of the mouth with *Oidium albicans*, *Saccharomyces albicans* or *Monilia albicans* it is most likely to occur during the first three months of life and it is not seen after dentition except in very ill children White or greyish white patches of false membrane form on the tongue, cheeks or gums In some cases painful sucking makes the baby disinclined to feed, in others there is little or no apparent disturbance and the patches are discovered on inspection of the mouth. Slight fever may occur and there may be some diarrhoea Confirmation of the diagnosis is made microscopically

OESOPHAGITIS

It is important to remember that in newborn infants thrush occasionally extends into the oesophagus and becomes a dangerous infection It causes vomiting im mediately after swallowing and there may be flecks of either bright or altered blood in the vomitus The interference with feeding and the accompanying diarrhoea make for dehydration and fatal cases have been described (Ebbs, 1938) Early

REHABILITATION

must be discouraged and tasks should be found which are within his or her limitations

PROGNOSIS

Although some cases are relatively benign Still s disease is usually serious because it has a long course and there are some fatalities There is a mortality of about 25 per cent in the group of cases coming on below the age of 5 years, in older children the mortality is small Fatalities occur in the first three years after onset, and the patients who recover completely (another 25 per cent) do so also within this period The remaining 50 per cent become quiescent usually within 5 years of the start of the illness but may have varying degrees of residual deformity and dwarfing of growth is apt to occur In most cases a long and fluctuating illness occurs and the infection seems to burn itself out only after many months, or in bad cases after some years In order that the parents may be saved from repeated disappointments it is necessary that they should have some warning of the probable character of the disease and of the duration to be expected

REGINALD LIGHTWOOD
MALCOLM MACGREGOR

d by Copeman Edinburgh,

Still G F (1897) *Med chir Trans* 80 47

SUBDURAL HAEMATOMA IN INFANCY

During the first two years of life subdural bleeding may occur and if neglected it causes mental retardation The diagnosis is readily missed if it is not kept in mind, and cases have sometimes remained undiagnosed for 3–6 months The haematoma is frequently bilateral Birth injury or a fall on the head is the usual cause and the trauma need not be severe Most of the cases develop during the first 6 months and the best results are obtained when treatment is begun within a month of the onset of symptoms

RECOGNITION

a fall the infant The commonest irritability and fever In the minority of cases it is noted that the head enlarges at a greater pace than usual Bilateral subdural puncture promptly and unequivocally establishes

local tenderness is discovered in the region of the diseased glands and the possibility of appendicitis needs to be excluded In a few severe cases peritonitis may ensue, ascitic or plastic, and this may be followed by the complications of abscess, sinus, obstruction and so on

unboiled milk has been taken especially in the last few weeks and after completing the physical examination there should follow a tuberculin test an estimation of the erythrocyte sedimentation rate, and skiagrams of the thorax and abdomen

TREATMENT

PREVENTIVE

The risk of *primary abdominal tuberculosis can be eliminated by the eradication* of bovine tuberculosis from dairy cattle This is quite possible and has been successfully done in many parts of the United States of America and in certain other countries Where bovine tuberculosis has not been eradicated it is particularly necessary to see that no tubercle bacilli are contained in the milk given to children *especially those under about 6 years of age For the first 2 years of life this should* be done by giving only boiled milk, thus preventing the possibility of infection by other pathogens as well, if unsterilized milk is given between the ages of 2 and 6 years, it should come from tuberculin tested cows

REMEDIAL

Since rest diminishes the activity of the bowel and also tends to lessen pain and

moderate carbohydrate and not much fat Dairy products and half-cream milk, chicken, fish, vegetables, vitamins, fruit and fruit juices are given As the child improves helpings are increased As he makes progress the sedimentation rate subsides and he may be allowed up The duration of treatment is about 3–6 months but is considerably longer in severe cases in which streptomycin and *para* amino salicylic acid (P A S) may be used Actinotherapy has been much practised, but vitamin D in high dosage would probably be more effective The dose for a child is 100 000 units of vitamin D (calciferol) given daily until the lesions appear to be

needed (Gauvain, 1948)

Treatment with natural sunlight has been successful notably in Switzerland and in country sanatoria elsewhere but it is less likely to be successful in cities because even when the sun is shining much of the ultra violet light is filtered off by mist and smoke The treatment is dependent on climatic conditions giving expectation of long periods of sunlight, although the value of sky shine is considerable

TREATMENT

PREVENTIVE

This consists of strict cleanliness on the part of the mother or nurse in regard to

REMEDIAL

The old treatment of oral thrush with glycerin and borax is relatively inefficient but a rapid cure is effected by applying to the mouth twice daily a 1 per cent aqueous

infant may be poor and special treatment for dehydration may be indicated

Ebbs I H (1938) *Arch Dis Childh* 13 211

TUBERCULOSIS—PRIMARY ABDOMINAL

GENERAL CONSIDERATIONS

After the lungs the small intestine is the second commonest site of entry for tubercle bacilli (15–20 per cent of all primary infections in England and Wales) In any given community the frequency of abdominal tuberculosis is in proportion to the amount of tuberculosis in the dairy herds it is known for example that the

end of the ileum Here an ulcer forms which is usually transitory and causes no symptoms although occasionally it may lead to diarrhoea and to pus cells blood cells and also perhaps tubercle bacilli being found in the stools When symptoms occur in primary abdominal tuberculosis pain is the commonest and it is to be expected especially in the cases that start with diarrhoea As the ulcer first forms and then heals infection spreads along the lymphatics to the neighbouring mesenteric glands which often caseate and again from this adenitis there may be little in the way of symptoms Generally within a few months the adenitis heals by fibrosis and calcification and at this final stage the diagnosis can be confirmed by radiological examination Thus in many cases of primary abdominal tuberculosis

the mesenteric glands In less severe cases the symptomatology may consist of vague complaints of abdominal pain and perhaps a rise of temperature On examination

which persists on one side instead of subsiding in the usual way Most tuberculous cervical gland masses caseate and the *tendency to liquefy is increased by the frequency* of secondary throat infection When liquefaction occurs the abscess approaches the skin, this becomes thinned, reddened and tense, but still there is little tenderness (the stage of "cold' abscess) The breakdown of a tuberculous mass may recur with disconcerting suddenness, and *when this has happened the* most favourable moment for excision has passed Next the abscess discharges and then, failing to dry up, a sinus persists

A correct diagnosis is essential and should be made without delay, for it is highly unsatisfactory for the patient when tuberculous adenitis is suspected and a waiting policy is adopted If it turns out that the adenitis is not tuberculous, anxiety has been caused unnecessarily, whereas if no plan is made and tuberculosis is the cause, a cold abscess may form before anything is done and the most favourable moment for excision is lost To avoid uncertainty it is necessary to carry out a tuberculin reaction test, if the reaction is positive skiagrams of the thorax, abdomen and the cervical glands are likely to demonstrate in which of these three regions a primary complex is located

Treatment

Tonsillectomy

If a tuberculous adenitis is part of a primary complex in the neck, it is nearly always best to arrange for removal of the tonsils (or remnants when tonsillectomy has already been attempted) by careful dissection This should be done under a

erythrocyte sedimentation rate should be recorded at weekly or fortnightly intervals If the adenitis resolves and the raised erythrocyte sedimentation rate subsides, then the patient should have convalescent treatment under medical supervision, and should be kept under observation for 12 months

Excision

If the adenitis remains substantially unaltered for 6–8 weeks after successful tonsillectomy, it is best to excise those glands which are found to be caseous *In* patients proved to be tuberculous, excision, if well performed, is no more likely to result in scarring and deformity than is "conservative" treatment which so often entails suppuration, incision and sinus formation *Excision almost always shortens* the period of treatment by many *months The treatment of a sinus is to keep it* covered with a sterile dressing, or cod liver oil may be applied A persistent sinus may need further surgery but calciferol should be used first

Medical

The results obtained by high-dosage vitamin D treatment (calciferol), similar to that recommended for lupus vulgaris are encouraging The usual dose for children is 100 000 units of vitamin D daily, given until the lesions are quiescent or until there are indications of toxic effects The first result is to cause a flare-up of

Exposures of only 5 minutes at a time should be given at the beg nning and these

can be given with safety

Convalescence at the seaside is advantageous Cod liver oil and ton cs should be g ven

When the signs of tuberculous peritonitis are present fever and wasting will be seen and complete rest should be strictly enforced streptomycin may be used The diet should be on the lines already advised except that in d arrhoeal cases a low residue diet will be followed In the ascitic form laparotomy is not advised and

ally a local zed abscess forms it is best left alone the most common sequence is for pus to d scharge from a sinus at the umbilicus or the abscess may rupture into the intestine

Gauva n S (1948) *Br t J Derm Şph* 60 174

TUBERCULOUS CERVICAL ADENITIS

In primary tuberculos s the groups of the lymphatic glands most commonly

PRIMARY TUBERCULOSIS CERVICAL COMPLEX

In these cases the tubercle bacillus is usually of the bovine type The primary focus is an evanescent insign ficant and usually unrecognized lesion in the tonsils adeno ds pharynx or gingivae Commonly the aden t s is un lateral occasionally bilateral Usually the child has been having unbo led and unsterilized milk some

entry and when they are histolog cally examined after removal tuberculous lesions are found in about 40 per cent of cases

Clinical Features

Characteristically a unilateral glandular mass forms and enlarges gradually though the swelling may develop rather suddenly sometimes with a rise in temperature Soon the indiv dual glands in the mass become matted together and there may be periadenit s Usually there is no tenderness from l ght pressure over the

resistant to streptomycin

RESULTS OF STREPTOMYCIN TREATMENT

The proportion of recoveries, as defined on the previous page, obtained by workers at different hospital centres, varies between 10 and 60 per cent, and such differences are to be expected for various reasons, notably that early diagnosis and institution of treatment are of the utmost importance It has also been thought that the age of the patients affects the results, children under three years of age being unfavourable (Medical Research Council, 1948) but an age disparity has not been confirmed by Cairns or by Cathie, whose figures are fairly consistent for all ages

Sequelae

Some of the neurological changes observed are caused by the tuberculous disease while others result from streptomycin itself The former group consists of chronic hydrocephalus, ataxia, cerebral palsy, blindness and mental deficiency Certain of these sequelae may improve as time goes on Deafness and vertigo, when they occur, are attributable to streptomycin itself

Cairns, H, and Taylor, Margaret (1949) *Proc R Soc Med* 42, 155
Cathie, I A B (1949a) *J Clin Path*, 2, 73

UPPER RESPIRATORY TRACT INFECTION

INTRODUCTION

Upper respiratory tract infection, a term now in general use, includes rhinitis

acute rheumatism acute nephritis and infective purpura (Henoch Schönlein) The brunt of the initial infection falls on the nose and throat where the lymphoid tissue

activity, generally followed by healing It is probably a useful pre-operative treatment and may make operation unnecessary (Gauvain 1948 a and b) It is also a valuable treatment for a sinus The rationale of this treatment is to stimulate the growth of fibrous tissue in the lesions and to encourage calcification There are important precautions to be observed which are mentioned on page 502 (Still's disease). Heliotherapy follows the same principle but is likely to be less effective In the treatment of adenitis the place of antibiotics in general, and of streptomycin in particular has not been worked out Irradiation (x rays or radium) has not established itself in the treatment though a sinus may heal after 2 or 3 applications of deep x ray therapy

The general care of the patient requires consideration In the earlier stages, while the sedimentation rate is raised, complete rest is advisable and if non-operative treatment is to be followed the neck is often immobilized with a splint or with a poroplastic collar When the stage of convalescence is reached the health may be improved by residence at the seaside It is inadvisable to allow the child to return to school until a cure has been obtained

TUBERCULOUS CERVICAL ADENITIS CAUSED BY LYMPHATIC SPREAD FROM A PRIMARY COMPLEX IN THE THORAX

The path followed by the infection is that of the lymphatic connexions passing

of the cervical glands in the lower part of the neck

Treatment

the cervical glands should break down it must be incised and the contents evacuated

TUBERCULOUS CERVICAL ADENITIS AS PART OF HAEMATOGENOUS DISSEMINATION

In certain cases of haematogenous tuberculosis the cervical glands may be affected This pathogenesis is the more likely when the adenitis is bilateral and when other anatomical regions are simultaneously affected, the spleen may be palpable and the lungs may show miliary tuberculosis

Treatment

In cases associated with miliary tuberculosis streptomycin should be given and the outlook is more favourable when this is started early In other cases the treatment is similar to that recommended for cases of tuberculous cervical adenitis caused by lymphatic spread upwards from the thorax

Gauvain S (1948a) *Brit J Derm Syph*, 60 174
— (1948b) *Tubercle* 29 259

Sulphones—Sulphones such as Promanide (Promine) have been tried, especially in the United States of America, and so far the results appear to be equivocal. At the Hospital for Sick Children, Great Ormond Street, Cathie (1949c) has found the

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Some of the neurological changes observed are caused by the tuberculous disease while others result from streptomycin itself. The former group consists of chronic hydrocephalus, ataxia, cerebral palsy, blindness and mental deficiency. Certain of these sequelae may improve as time goes on. Deafness and vertigo, when they occur, are attributable to streptomycin itself.

42, 155

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than in the subsequent children—but if living accommodation is inadequate and the family is over-crowded a child enters these bacterial duels a year or so earlier and attendance at a day nursery has the same effect This phase of repeated infection is of varying duration (approximately 3–6 years) depending on inheritance, diet and environmental factors, and it persists until considerable immunity has been built up

The view that the lymphoid tissue of the nose and throat is concerned in the acquisition of immunity is more than hypothetical (Rantz, Jacob and Kirkby, 1943) for evidence has been found of reaction to bacterial toxins and phagocytic activity in the germinal centres of lymph nodes Moreover, the structure of the tonsil, with its irregular surface and numerous deep crypts, lends itself to the task of trapping bacteria, and the exudate which is such a familiar feature of follicular

[illegible]

behaviour of adenoids during infection is somewhat similar, though for obvious reasons not so easily or frequently studied as with the tonsils. In adenoid pads, removed at operation, caseous plugs are found just as they are in tonsillar crypts During coryza and sinusitis the adenoids are continually bathed with infected mucus or muco-purulent discharge, under these circumstances they inflame and swell perhaps more readily than the tonsils

GENERAL PREVENTIVE MEASURES

Under the conditions of civilization respiratory infection is inevitable but attempts to limit it are an important part of social welfare The most important measures

[illegible]

annually by the invention and construction of an efficiently ventilated railway

[illegible]

clear of dental sepsis Orthodontic treatment may be necessary, and in a child with

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Cathie, I A B (1949a) *J Clin Path*, 2, 73
— (1949b) *Lancet* 1 441
— (1949c) Personal communication
Lincoln E M (1947) *Amer Rev Tuberc*, 56 95
Medical Research Council (1948) *Lancet*, 1, 582
Rubie J and Mohun A F (1949) *Brit med J*, 1, 338
Wallgren, A (1938) *Lancet*, 1, 417

UPPER RESPIRATORY TRACT INFECTION

INTRODUCTION

Upper respiratory tract infection, a term now in general use, includes rhinitis, nasopharyngitis, tonsillitis, laryngitis and is closely associated with bronchitis. It is the commonest of all the types of infection to which children are prone, and the cause of much other illness, often serious, which may follow in its wake including acute rheumatism, acute nephritis and infective purpura (Henoch Schönlein) The brunt of the initial infection falls on the nose and throat where the lymphoid tissue reacts more or less briskly being well sited in this region to receive the bacteria entering the mouth and nose, and it is a reasonable hypothesis that the tonsils and adenoids, forming as they do important concentrations of this lymphoid tissue are concerned in protecting the individual and in helping to immunize him against an [i]nevitable succession of bacterial invasions Soon after the age when children begin [t]o meet with these repeated infections, lymphoid development (hypertrophy) is at [it]s height In country bred children and in those of the higher income groups th[i]s [ph]ase is reached at about 4–5 years of age—usually a little later in the first child

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GENERAL PREVENTIVE MEASURES

Under the conditions of civilization respiratory infection is inevitable but attempts to limit it are an important part of social welfare. The most important measures are those instituted or guided by Public Health Authorities, and education in personal hygiene Specific immunization will not begin to play a major part until

the National Health Service and industry could be saved millions of pounds annually by the invention and construction of an efficiently ventilated railway passenger coach. Poor ventilation and

factor; fog in smoky towns is a cause of recurrent waves of respiratory infection in winter which could be greatly mitigated by smoke prevention

Full account needs to be taken of personal hygiene Resistance to infection can be increased by the provision of good clothing and adequate footwear. The bed-

clear of dental sepsis Orthodontic treatment may be necessary, and in a child with

a poorly developed airway and poor expansion of the chest great benefit may be derived from breathing exercises as well as by inculcating good stance and posture. It is by attention to these details of living that the candidates for tonsillectomy will be reduced.

DIET

Diet probably plays an important part in regard to resistance, as shown by the high incidence of infection among populations subjected to prolonged semi-starvation, the protein fraction of diet probably has the greatest influence (see page 993) Particularly in patients who show diminished resistance to infection is it necessary to ensure a more satisfactory intake of first class protein and a diet rich in protective food-stuffs.

Protective foods

The protective foods are those which promote growth and maintain health.

Dried household milk contains as much bone-forming material (calcium and phosphorus) as

owing

rming

make

Crooks, J (1947) *Diseases of Children*, 4th ed , Vol I Ed by Paterson and Moncrieff London, Arnold
Rantz, L A , Jacob, A H., and Kirkby, M (1943) *J. Clin. Invest* , 22, 419.

than in the subsequent children—but if living accommodation is inadequate and the family is over-crowded a child enters these bacterial duels a year or so earlier and attendance at a day nursery has the same effect This phase of repeated infection is of varying duration (approximately 3–6 years) depending on inheritance, diet and environmental factors, and it persists until considerable immunity has been built up

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Under the conditions of civilization respiratory infection is inevitable but attempts to limit it are an important part of social welfare The most important measures are those instituted or guided by Public Health Authorities, and education in personal hygiene Specific immunization will not begin to play a major part until

crowding, yet regulations applying to schools and certain public buildings have not prevented the neglect of elementary hygiene in other places For example, the ventilation in most trains and public vehicles is lamentable and it is probable that the National Health Service and industry could be saved millions of pounds annually by the invention and construction of an efficiently ventilated railway

factor, fog in smoky towns is a cause of recurrent waves of respiratory infection in winter which could be greatly mitigated by smoke prevention

Full account needs to be taken of personal hygiene Resistance to infection can be increased by the provision of good clothing and adequate footwear. The bed-

easure in certain cases of nephritis but their observations are usually uncontrolled insufficiently followed up The value of tonsillectomy as a *prophylactic measure* is been more carefully studied in acute rheumatism with the result that it is now nerally thought to have no effect in preventing first attacks or recurrences, but pears to reduce slightly the risk of carditis

In Great Britain tuberculosis of the cervical lymphatic glands is a common con tion no longer, however, when the pharynx is the portal of entry, tuberculosis reads along the lymphatic channels to the glands at the angle of the jaw usually oducing a unilateral mass which may be of considerable size Such a mass of berculous glands is subject on account of its site in relation to the pharynx, to condary infection, often with streptococci, and is more liable to suppuration than tuberculous adenitis in any other place Experience shows that in these cases of rvical gland tuberculosis tonsillectomy is of value so long as it is a complete peration

Some children show a pronounced tendency to vomiting with their infections

iring an attack of vomiting and so have the opportunity of discovering and cating any possible transient infection A diagnosis of recurrent tonsillitis made this connexion is often held as an indication for a tonsillectomy

It may be said in summary that clinicians with balanced judgment will see little

weighed against the possibility of a recurrence of rheumatic infection as an mediate sequel to the operation and in all cases of rheumatic children with eptic tonsils requiring tonsillectomy, a prophylactic course of penicillin should ver *the immediate post operative period Similar advice applies to patients* covering from acute nephritis

HE INDICATIONS FOR TONSILLECTOMY

A decision to remove the tonsils should not be made without a complete ex mination, including the whole region of ear, nose and throat The main indications r the operation are found in the local examination, but the history is also im

to be done in such cases to help the child through to overcome the

uses congestion, oedema and proliferation of the lymphoid

velling subsides as the infection is overcome but the lymphoid proliferation rsists *for a variable period of time and the enlargement* resulting from it is not

TONSILS AND ADENOIDS—THE PROBLEM OF

discussed on

and on such a vast scale In the decade preceding World War II, in the United States of America over 1½ million tonsillectomies were being performed on children under 15 years of age in each year (Collins, 1938), which represented approximately one-third of the operations performed there under general anaesthesia,

, 200,000 Both

ble controversy

be valuable to

mention here certain important and little known facts In 1938, Glover made a valuable survey for the Board of Education of the incidence of tonsillectomy in connexion with social, environmental and other factors The regional incidence of this operation varied enormously, for example, during a particular year the

dence of tonsillectomy and factors such as poverty, overcrowding and climate

were merely red and enlarged

THE TONSILS

Reasons For and Against Removal

Unless the tonsils are chronically infected and undergoing fibrosis, it is doubtful whether their removal will do good, and several reports show that routine tonsillectomies have no beneficial effect on the general condition of groups of children, including their average gain in weight, in fact, published evidence suggests the reverse (Vining, 1929, Paton, 1928) In addition to the specific surgical in-

all common operations in surgery

Yet in spite of the evidence of the frequency of incomplete tonsillectomy, the published results of the operation have usually failed to take this factor into account Obviously comparisons between conservative and operative treatment of diseases associated with infected tonsils can be misleading unless all the cases showing remnants are excluded, but this factor is not allowed for in the majority of the reports

THE ADENOIDS

A variety of complaints has been ascribed to adenoids, and treated by their

to the scientific approach

Enlarged adenoids have been held to be the cause of mouth breathing, although it is now thought that intranasal infection is a more important one Enlarged and infected adenoids are associated with infection or blocking of the Eustachian tubes and are thus concerned with the problem of recurrent otitis media and deafness

adenoids they can be seen by skilful clinical examination and demonstrated by a lateral skiagram A decision to remove adenoids should not be made without a complete examination, including that of the ears, nose and throat

RESULTS OF ADENOIDECTOMY

posterior aspects of the posterior pillars of the fauces Thus, a ... tion of the pharynx may follow adenoidectomy, and recurring sinusitis and otitis often date from the operation Damage of the superior constrictor muscle of the pharynx may interfere with the proper function of the nasopharynx After tonsil and adenoid operations recurrent coryza may begin to take on the character of bronchitis

When the adenoids are well removed for correct indications there is usually obvious and speedy improvement in the condition of the child, a sinus infection may clear up, nasal breathing again becomes possible, sleeping and eating may improve, and the child happier and more co operative

an indication for tonsillectomy "Enlarged tonsils," remarked T B Layton,

other hand, in addition to lymphoid hyperplasia there may be much proliferation of fibrous tissue A normal tonsil is a soft structure capable of being squeezed and

tonsillitis. Redness of the tonsils, perhaps spreading to the anterior pillars of the fauces and uvula, is a less certain indication since subsequent examination may show its disappearance, and when local signs are not definite sufficient time should be given for spontaneous recovery aided by local treatment (*see* Subacute Tonsillitis and Pharyngitis, page 523)

Results of Tonsillectomy

Although in good hands the operation for tonsillectomy usually goes smoothly, a number of immediate sequelae are possible, these include pneumonia, bronchitis, pulmonary embolism, otitis, mastoiditis, meningitis, anaemia from loss of blood, septicaemia, pyaemia, nephritis, rheumatism, chorea, torticollis, temporary paresis of the soft palate, and occasionally psychological symptoms

When a tonsillectomy is performed for correct indications, it will justify itself in the result, and the selection of cases for operation depends upon individual experience which unfortunately is essentially a question of clinical impressions rather than exact evidence, since there is very little statistical work to prove or disprove the value of the operation When tonsillectomy turns out to have a disappointing result it is often because proper indications were absent or because the operation failed to eradicate infection from the nose and throat, including incomplete tonsillectomy

Incomplete tonsillectomy

Failure to remove the whole of both tonsils is a frequent error, but by no means the only technical failure Tonsillar remnants, if large enough, can be removed by a

studies, the figures of four different observers before World War II (quoted by Illingworth, 1940) when averaged show that over 50 per cent of tonsillectomized

Remedial

The treatment of tonsillitis has been revolutionized since the introduction of

full doses for a predetermined number of days usually four The common mistake is to

it for

now

The last mentioned, being less rapidly excreted, gives higher blood levels and so it is administered less frequently and in smaller doses With the other preparations the dose is the same and can be seen from an example

this age is from 1 tablet (0 5 gramme) every 6 hours during day and night up to 1½ tablets (0 75 gramme) 4 hourly day and night

It may be convenient to administer a sulphonamide to children in the form of an emulsion and the standard strength should be 0 5 gramme in every 4 millilitres Proprietary preparations are available, Sulphamezathine Oral Suspension for Children is an orange flavoured one having the standard strength or the following may be prescribed

Sulphamezathine	8 gr	0 5 g
Syrup of orange	20 min	1 2 ml
Dill water	15 min	1 0 ml
Promulsin (2 per cent) to	60 min	4 ml

This emulsion needs to be shaken frequently and cannot be used from stock because its deposit soon sets hard

During sulphonamide medication it is necessary to give plenty of fluid in order to facilitate its excretion, it is also advisable to administer an alkaline mixture such as Mistura Potassii Citratis Alkalina pro Infantibus (*N F*), 4 millilitres every 4 hours

Penicillin —This too is an extremely effective treatment, though somewhat less easily administered Alkalis are not required when penicillin is being given

Diet —Many of the patients will lose any desire for food and vomiting is a

clean

Ferri et

errodic

ty lasts

rheumatism, carditis and nephritis one month after any throat infection

AFTER CARE

After removal of the tonsils and adenoids the child should be kept under observa-

Collins S D (1938) *Publ Hlth Rep, Wash*, 53, 587
Crooks J (1947) *Diseases of Children*, Vol 1, 4th ed Ed by Paterson and Moncrieff London, Arnold
Glover, J A (1938) *Proc R Soc Med*, 31, 1219
— and Wilson, J (1932) *Brit med J*, 2, 506
Illingworth R S (1939) *Lancet*, 2, 1013

TONSILLITIS AND PHARYNGITIS

ACUTE TONSILLITIS

EPIDEMIOLOGY

This is an infectious disease due to one of a number of different organisms, the

generally acknowledged that there is no very logical distinction to be drawn between streptococcal tonsillitis and scarlet fever

TREATMENT

Preventive

Except in institutions such as hospitals and convalescent homes for children, there is little scope for direct preventive measures though much can be done by avoiding unnecessary contact with infected persons In hospitals and similar places cross-infection is an important problem and is receiving a great deal of attention (Medical Research Council, 1944), among other measures sulphonamide prophylaxis has been tried, sometimes with good results and sometimes with conflicting ones

Tonsillitis is a common disease in all classes A child living in healthy surroundings and taking a good diet is hardly less liable to tonsillitis when exposed to infection than one living under less satisfactory conditions Overcrowding merely *increases the frequency of contact with infection and may thus be responsible for an* epidemic of streptococcal or other throat infection The common direct sequelae of tonsillitis, such as adenitis, otitis media and sinusitis, also occur without much relation to socio-economic status On the other hand, a child being brought up in good environmental surroundings is less liable to serious post streptococcal disease, especially acute rheumatism, and also perhaps to acute nephritis and post infective purpura

VULVO-VAGINITIS

AETIOLOGY

The successful treatment of vulvo-vaginitis requires an understanding of its causes It is commonest between the ages of 2 and 7 years and far less often seen in girls aged 10 years or more In young children, after the neonatal period, the vaginal mucosa is quite thin and therefore less resistant to infection, and the vaginal secretion is alkaline and scanty, later with the approach of puberty the amount and secretion increases, its reaction becomes acid, it is then more bactericidal, and Döderlein's bacillus is found, these changes are important in resisting infection

smears and cultures examined The causes of non-gonococcal vulvo vaginitis are local and general Local causes include faulty hygiene, direct infection by the fingers of the child or attendant, threadworms, chemical disinfectants and foreign bodies General causes include acute infections, the exanthems and debilitating diseases The condition may be seen at the onset of measles and chicken-pox, and after scarlet fever, tonsillitis, sinusitis and so on When it follows scarlet fever and tonsillitis the infecting organism is usually a streptococcus, and when secondary to

... A mixed bacterial flora and a brownish

Diphtheroid

of the above

but are probably not the true pathogenic cause Diphtheria bacilli are occasionally responsible

TREATMENT

PREVENTIVE

This consists of attention to hygiene Clean drawers should be worn, thread worms and urinary infections treated, and the use of irritating antiseptics added to the bath water should be avoided If a child is found, on admission to an institution, to have vulvo-vaginitis, a swab should be taken for examination and the child given barrier nursing Cases of gonococcal infection should be strictly isolated because they are contagious

REMEDIAL

Mild infections require very little treatment except attention to local hygiene, more severe infections, particularly those of short duration, often respond readily to treatment if the cause is ascertained, some chronic cases are obstinate and may require careful and prolonged treatment

GENERAL TREATMENT

Efficient treatment requires that the bacteriological cause and its sensitivity to various specific remedies are known Thus, the oral administration of a sulphonamide is indicated for a streptococcal infection This should be continued for 7–10 days, but one must remember to look for the source of infection in tonsils, sinuses, whitlows and skin infections, otherwise the condition may recur An effective

SUBACUTE TONSILLITIS AND PHARYNGITIS CHRONIC TONSILLITIS

or to repeated subacute infection, and sometimes the condition develops into a genuine chronic tonsillitis Then there is a considerable increase in the fibrous tissue which converts a normally soft structure into a firm one and thereby interferes with the normal drainage from the crypts In this case the tonsil becomes a

from fibrotic tonsils and tonsillar remnants When infection persists in the maxillary antra and ethmoidal air sinuses, subacute or chronic tonsillitis and pharyngitis are often present as well Carious teeth may also be the cause of tonsillitis Chronic pharyngitis is sometimes seen following removal of tonsils and adenoids, there being infection and hypertrophy of the lymphoid follicles of the pharyngeal wall, and also sometimes when there has been scarring of the pillars of the fauces as the result of unskilful operation Since there are so many causes of subacute and chronic throat infection, it is essential to examine completely the region of ear, nose, mouth and throat before deciding on treatment, which should be in accordance with the findings

Remedial Treatment

In certain cases the tonsils are seen to be fibrous and chronically infected, and their removal is necessary In border line cases, when there is no certainty that recovery from the infection is possible, measures should be taken in an effort to overcome it, either by means of local treatment or by giving a course of a sulphonamide or penicillin—which is more especially helpful when the temperature has been elevated Gargles are almost useless Penicillin lozenges or chewing gum are worth a trial, or throat paints and sprays may be used (silver proteinate or sulphonamide solutions) In a young child attempts to paint the throat may be unsuccessful, and then it is useful to remember that the throat can be reached with drops *via* the nose The drops are instilled with the child lying supine with its head fully extended and in this position they will pass through the posterior nares to the pharynx This treatment is particularly indicated when there is an associated nasal infection

Sulphacetamide	10 per cent
Ephedrine	0 5 per cent,
Isotonic saline	1 fl oz.

Many other forms of non-operative treatment have been advocated, such as sucking and squeezing procedures, vaccines, and short wave diathermy; whichever

times be traced to such a cause

Medical Research Council (1944) 'The Control of Cross Infection in Hospitals.' *War Memorandum No* 11 London H M Stationery Office

DEHYDRATION

DEFINITION AND DESCRIPTION

Dehydration is reduction in total body water It is of great practical importance because it occurs frequently in many common medical and surgical conditions and is often the cause of death

Normally, water forms 70 per cent of the body-weight 50 per cent being intracellular and 20 per cent extracellular (interstitial tissue fluid and the blood plasma) In a man of 70 kilograms (154 pounds or 11 stones) intracellular fluid is approximately 35 litres* and extracellular fluid 14 litres, of which 11 litres is tissue fluid and 3 litres is plasma

* British pint = 0 57 litre U S A pint = 0 47 litre

Dehydration arises in two main ways

(a) Insufficient intake of water

(b) Excessive output of bodily secretions (vomiting, diarrhoea, sweating and the like)

In the past it was not fully appreciated that the states of dehydration produced by (a) and (b) are *fundamentally dissimilar* in physiological effects, clinical features and needed treatment They were confused and it was assumed that water deficiency was the essence of both Recent advances have shown that simple lack of fluid intake causes depletion of *water* alone On the other hand, output of bodily secretions the commoner cause, results in depletion of water *and salt* and cannot be relieved unless salt is administered as well as water

CAUSATION

INSUFFICIENT INTAKE OF WATER

to swallow
ause of
ie oeso
phagus Occasionally it may be due to therapeutic restriction or to nursing neglect Under non clinical conditions water may be unavailable, as when men are in water less regions or adrift at sea

Dehydration is inevitable because certain unavoidable water losses daily continue whether or not water is taken

Loss	Adult of 70 kilograms	Infant of 7 kilograms
Vaporization (lungs and skin)	1 000	200
Minimum urine	500	100
	1 500	300 millilitres

LOCAL TREATMENT

Subsequent to the introduction of treatment with sulphonamides and penicillin

solution, and Dettol, $\frac{1}{2}$ teaspoonful to 1 pint of water Local treatment should not be continued for more than a few days and is best changed rather frequently If a

treatment until its presence is discovered and local painting with 1 per cent gentian violet solution carried out, several such treatments may be required and an anaesthetic is advised

REGINALD LIGHTWOOD

extracellular fluid Before doing so, it is necessary to point out that this fluid, apart from the plasma proteins [illegible]
to and fro a [illegible]
stituents ex[illegible]
capillary me[illegible]
(a) *Simpl*[illegible]
concentratio[illegible]
found that, [illegible] days without water, plasma sodium increased by 30 milli grams per 100 millilitres This hypertonicity causes water to be abstracted from the cells so that the water loss *affects both extracellular and cellular fluids* The drain from the relatively large cellular "pool" *prevents much decline in extra cellular fluid volume*

(b) *Secretion losses* involve loss of sodium and chlorine ions as well as water Therefore, extracellular osmotic pressure is decreased and there is consequent *reduction in extracellular fluid volume* in proportion to sodium deficit Water administered freely is not ' held" but is excreted by the kidneys which sacrifice extracellular fluid volume to preservation of near isotonicity This sacrifice may cause the extracellular fluid volume to shrink as low as one third of normal when there is a very gross deficit of sodium ions

CLINICAL FEATURES

Simple Water Depletion (also called Primary Dehydration)

Diminished salivation leads to the first symptom—thirst Ultimately the mouth may become so dry that the swallowing of dry food becomes impossible The urine volume falls to 500 millilitres, or less, per day and its specific gravity may rise to 1 040

Because decline of extracellular fluid volume, particularly plasma volume, is slow the blood pressure and the quality of the pulse are well sustained for several days Circulatory failure is a late feature

For the first 3 or 4 days fair physical performance is possible and the patient does not feel severely ill but has malaise Later, weakness increases till, finally, pros tration and low delirium signify the terminal phases

[illegible]

Secretion Losses

In practice secretion losses are the commonest causes of dehydration The symptoms differ according to whether or not there has been free intake of water

(i) *If water intake (without salt) has been free* the patient suffers from dehydration due solely to osmotic inability of the extracellular fluid to ' hold ' water This may be called ' pure salt depletion" or "secondary dehydration" It is of great clinical importance and yet is frequently unrecognized

(ii) *If water has not been taken or has been taken in insufficient amount* the patient shows a mixture of the symptoms of primary and secondary dehydration This is because continuing unavoidable water losses, over and above the secretion losses have caused water loss to exceed salt loss

Therefore, if there is no intake at all, adults lose daily 2 per cent of body-weight and infants 4 per cent. Death occurs when loss exceeds 15 per cent

EXCESSIVE OUTPUT OF SECRETIONS

(b) *Excessive* OUTPUT OF SECRETIONS, with loss of water and salt, occurs from loss of

(i) *Alimentary secretions* from vomiting, diarrhoea, fistulae or therapeutic aspiration of the contents of the stomach or intestines by Ryle or Miller-Abbott tubes

(ii) *Sweat* when perspiration is very profuse

It is only necessary to recall the many causes of vomiting and diarrhoea to realize the frequency in practice of water-salt loss in alimentary secretions The volume of fluid lost may be several litres daily and the loss of sodium ions and chlorine ions may exceed the equivalent of an ounce (28·5 grammes) of salt per day. The severity of such loss will be appreciated as the total salt content in the entire body of an adult man is about 6 ounces

In the tropics, sweating is a very important cause of water-salt loss and sweat

Addison's disease and mercurial diuretics represent special cases of water salt loss by the medium of the urine Normally the kidneys cease to excrete sodium and chlorine

provoke Occasionally, they produce dangerous salt depletion when administered to patients on very low salt diets (Ray and Burch, 1949, Soloff and Zatuchni, 1949)

DIFFERENCE IN PHYSIOLOGICAL EFFECTS

Understanding of the difference between the effects of simple lack of water intake and of secretion losses is essential to both diagnosis and treatment It is of vital practical significance because, while right treatment can be life-saving, wrong treatment can be lethal

These fluids are of quite different composition and separated by the innumerable cell membranes which are freely permeable to water but not to the main electrolyte ions Therefore, their relative osmotic pressures chiefly determine the distribution of water between them The extracellular fluid is the "internal environment" which surrounds the cells and its composition, resembling that of sea-water, is explicable on an evolutionary basis Body-regulating mechanisms preserve constancy of all the properties of extracellular fluid and especially constancy in its osmotic pressure as changes might impose damaging shifts of water out of or into the cells

Extracellular osmotic pressure is almost entirely derived from its sodium and chlorine ions In reality, the sodium concentration is the determining factor because sodium forms more than 90 per cent of the extracellular base and concentrations of chlorine and other acid ions are subordinate, and adjusted to, total sodium

The key to understanding the respective effects of insufficient water intake and secretion losses is to focus attention on the changes produced in the tonicity of the

output until the late stages Another reason is that it is often mistakenly interpreted as being primarily due to certain manifestations which are, in fact, secondary Thus the oligaemia, fall of blood pressure and reduced total circulation lead to [illegible]

may be well over 200 milligrams per 100 millilitres, this often prompts the diagnosis of "uraemia" The development of anorexia, nausea and vomiting, together with signs of gastro-intestinal dilatation, may suggest diagnoses such as "acute dilatation of the stomach", "paralytic ileus" or "intestinal obstruction"—especially in the post-operative period after abdominal operations, a time when secondary dehydration is particularly common Naturally, such primary conditions are real possibilities and to make the converse error of wrongly diagnosing them as "secondary dehydration" is equally serious However, at the present time the pendulum has not yet begun to swing to this extreme and the usual error is to miss electrolyte loss as the basic fault

The main similarities and differences between pure primary and pure secondary dehydration are summarized in the following Table

TABLE

SIMILARITIES AND DIFFERENCES BETWEEN PURE PRIMARY AND PURE SECONDARY DEHYDRATION

Manifestation	Pure primary dehydration (water depletion)	Pure secondary dehydration electrolyte (salt) depletion
Dehydration	+ + +	+ + +
Thirst	+ + +	Absent
Lassitude	+	+ + +
Orthostatic fainting	Absent till late	+ + +
Urine volume	Scanty	Normal till late
Sodium chloride in urine	Often +	Absent, except in Addison s disease
Vomiting	Absent	May be + + +
Cramps	Absent	May be + + +
Blood pressure	Normal till late	Fall + + +
Plasma sodium chloride	Slight increase	Diminished + + +
Plasma volume	Nearly normal	Decreased + + +
Blood urea	+	+ + +
Haemoconcentration	Slight	+ + +
Blood viscosity	Nearly normal	Increased + + +
Water absorption	Rapid	Slow
Mode of death	Uncertain	Peripheral failure

Mixed water and salt depletion—mixed primary and secondary dehydration

This condition, also common, arises when there have been secretion losses and water has not been taken or has been taken in inadequate amount

The patient shows a mixture of the symptoms of primary and secondary dehydration There is reduction of extracellular fluid volume and, therefore, symptoms of secondary dehydration are present lassitude, weakness, and oligaemic collapse of blood pressure plus thirst and oliguria

CLINICAL FEATURES

These two clinical subtypes, arising from secretion losses will be described in detail

'Pure" salt depletion or secondary dehydration

As stated above, this condition arises when there have been secretion losses but free intake of water It is common in these days of insistence on high fluid intake but is often not correctly diagnosed because the patient *is not thirsty* and because urine output may be little reduced, or even increased until the late stages

The main clinical features are determined by the early and gross reduction in plasma and tissue fluid volumes

with nausea and vomiting The vomiting is important because it further increases electrolyte loss it is practically invariable in severe secondary dehydration and needs to be disentangled from vomiting which may primarily have caused the condition The stomach becomes atonic and dilated and there may be pylorospasm (it is the picture of acute dilatation of the stomach) There may also be atony of the intestines (ileus)

Weight loss is marked and of the approximate order of 1 kilogram per 3 4 grammes of sodium deficit (McCance, 1936) Loss of subcutaneous tissue fluid causes the face to look sunken and the skin to lose its elasticity and become wrinkled

The blood pressure falls and may ultimately be unrecordable There is parallel deterioration of the quality of the pulse and usually some tachycardia The shrinkage in plasma volume may, if extreme, cause marked haemoconcentration and rise in blood viscosity The haemoglobin percentage may rise to 150 and the red-cell count to 7–8 millions The final phase is extreme peripheral circulatory failure in a stuporose patient with pallid or cyanosed skin and cold extremities When the blood pressure falls to 70–80 millimetres of mercury anuria ensues

The whole clinical picture is seen in uncomplicated form in heat exhaustion (*see* page 541) in otherwise healthy subjects who have suffered severe losses of water and salt from extreme sweating and who have drunk water freely but not repaired salt loss

It cannot be too strongly emphasized that the same syndrome often occurs in patients who have suffered from vomiting and/or diarrhoea and been given water only Another cause of practical importance is gastric or intestinal aspiration by Ryle or Miller-Abbott tubes. Such aspiration, combined with rectal or intravenous restoration of electrolytes can be of great value in obstructive conditions of the alimentary tract However, if electrolytes are not replaced, and water only is given, then the patient must inevitably pass into secondary dehydration As gastric atony and dilatation are features of this state, their development is often interpreted as an indication for yet more aspiration

As has been said, the true nature of "pure" secondary dehydration tends to be missed because of the absence of thirst and the continuance of adequate urine

change from yellow to reddish brown The number of drops needed to produce the end-point gives the *concentration of chloride in the urine* expressed as grammes per litre of *sodium* chloride—for example 5 drops equals 5 grammes of sodium chloride per litre It is important to make a preliminary test with distilled water to ensure that there is no contamination of reagents or apparatus with chloride The same pipette should be used throughout a test to secure equal size drops of urine and

INDICATIONS FOR REMEDIAL TREATMENT OF ESTABLISHED DEHYDRATION

The mere fact of the presence of definite dehydration indicates a need for treatment Evidence of dehydration is provided by the symptoms and signs described already under Clinical Features

Simple recognition that dehydration is present is not in itself a sufficient guide as to what needs doing An attempt at quantitative diagnosis of the degree of dehydration is also necessary

Quantitative assessment is best based on consideration of the patient as a whole rather than on isolated observations *The following quantitative correlations of* manifestations and deficits are put forward as rough guides to therapeutic appraisal (Marriott, 1947)

(*a*) *Primary dehydration* (*simple water depletion*)

(i) *Early* —Thirst is definite but other effects are not yet present, deficit approximately 2 per cent of body-weight or 1 5 litres (3 pints) in 70 kilograms (11 stones) man

thirst and dryness of

of approximately 6

reme weakness and

delirium deficit 7–14 per cent of body-weight or 5–10 litres (1–2 gallons)

(*b*) *Secondary dehydration, pure or mixed*

(ii) *Moderately severe* —Absence of chloride in urine,

fainting, anorexia and maybe nausea and vomiting, also fall of blood pressure, but systolic blood pressure above 90 millimetres of mercury deficit equivalent to

or up to amount in 4–6 litres

orose, vomiting systolic

is 0 75–1 25 gramme of

s (11–18 pints) isotonic

saline

the component of excess water depletion and the case becomes converted to one of "pure" salt depletion or secondary dehydration

TREATMENT

Indications for Preventive Treatment

(a) The circumstances of the case suggest that dehydration may arise

(b) Control observations show that depletion of water or/and electrolytes is

disease

(b) *The main control observations which should be instituted in every case of potential or actual dehydration and maintained until all danger has passed are 8 hourly measurements of urine volume and of urine chloride concentration*

In addition of course, there should be measurement of fluid intake by all routes and record kept of the nature of fluids administered Similarly all fluid losses by vomiting aspiration, diarrhoea, must be charted Also repeated observations made of the patient's clinical state with special attention to points mentioned above under Clinical Features

Eight hourly check of urine volume and chloride concentration is essential because longer observational periods, such as 24 hours may permit the development of dangerous degrees of dehydration (particularly secondary)

Observation of *both* urine volume and chloride concentration is necessary because volume measurement alone will not reveal the development of pure secondary dehydration—now common because of the prevalent practice of relying on intake and output measurement as being an adequate criterion

selected as a main criterion of electrolyte balance since it has earlier been said that sodium ions are of chief importance and chlorine ions of subordinate significance The reason arises from practical convenience Unfortunately, there is

fallacious

Test for urinary chloride —The technique of a simple quantitative test for urinary chloride (Fantus, 1936) is as follows 10 drops of urine are measured into a small test tube from a pipette which is then rinsed with distilled water and used to add one drop of 20 per cent potassium chromate solution—the indicator The pipette is again thoroughly rinsed and used to add 2 9 per cent silver nitrate solution, a drop at a time, the test tube being shaken after each drop The end point is a sharp colour

In simple water depletion (primary dehydration) there is rise above normal in the concentrations of both sodium and chlorine ions In secondary dehydration there is fall in the concentration of sodium and chlorine ions but, as Abbott (1946) has pointed out, the concentrations of these ions give an inaccurate impression of the *total* amount of them which has been lost This is because the kidneys, working to maintain the prime essential of isotonicity excrete water for as long as possible to preserve normality of ionic concentration How then can concentration estimations reveal total deficit? What can at least be said is that any marked fall in plasma levels indicates very gross electrolyte depletion Bartlett Bingham and Pedersen (1938) have propounded a rule that each 100 milligrams of plasma chloride below 560 milligrams requires administration of 0 5 gramme of sodium chloride per kilogram of body weight

PROBLEMS OF PRACTICAL TREATMENT

The indications for preventive and remedial treatment have been discussed Once it is decided that a patient is threatened with dehydration or has in fact already become dehydrated then the *regulated* administration of water and salt *becomes necessary and the following practical questions automatically arise*

(1) How much water and salt?
(2) By what route and at what rate of administration?

(1) *How much water and salt?*

The essential principle is administration of enough to maintain or restore balance as shown by absence of dehydration symptoms and attainment each 8 hours of a urine output of a pint or 20 ounces (570 millilitres) with a chloride concentration of 3–5 grammes per litre A *quantitative* approach is essential

Maintenance of balance (preventive treatment)—Dehydration will be threatened losses or a combination of both

nply a matter

nts should be

taken as being 5 pints (2 85 litres) of water and 5 grammes of salt Five pints of water will be needed to ensure 3 pints (1,700 millilitres) of urine since unavoidable

more than enough to

(2 85 litres) water and 5 grammes salt, *plus* volume and

losses

The volume of secretion losses may be capable of direct measurement (vomit collection is a matter of *prime*

e volume must be estimated

constantly be checked by the results of replacement therapy on the patient s general condition the urine volume and even body weight if it is feasible to weigh the patient With infants urine collection may be difficult and weighing much easier

Certain fallacies regarding measurements of urine volume and urine chloride concentration as indications of dehydration

In general these observations are reliable guides if *taken together* and in conjunction with repeated survey of the entire clinical features of the particular patient However, in certain exceptional circumstances they may mislead

(i) *Urine volume may be "inadequate"* when there is in fact, water retention This may occur either before or during fluid administration (a) When there is salt retention due to renal disease or excess salt administration, (b) when cardiac failure or hypoproteinaemia cause an extracellular fluid shift into the interstitial spaces from the plasma

(ii) *Urine volume may be "adequate"* when there is, in fact, actual dehydration The chief cause, already discussed, is extracellular hypotonicity (secondary dehydration) which will generally be shown by low urine chloride

lost are derived from beyond the pylorus, that is, fistulae and diarrhoea Denton (1949) has reported the case of a patient who, for 45 days, lost 2–4 litres daily from a duodenal fistula The fluid contained twice as much sodium as chlorine but the urine, during prolonged saline administration, contained twice as much chlorine as sodium and 6 grammes of chloride per litre were present when there were still marked symptoms of secondary dehydration

The possibilities of error from reliance on urine volume and urine chloride have been discussed because they may be important in a small minority of cases However, the writer has found these criteria of real practical value and seldom misleading This has also been the experience of Van Slyke and Evans (1948) and Paine and Duff (1949)

BLOOD ESTIMATIONS AS INDICATIONS FOR TREATMENT

Various blood estimations have been used in the diagnosis and control of therapy c
alkali re
globin p
each may have special value in certain instances but, in the writer's opinion, these estimations are not necessary in the management of the vast majority of cases and none is of as much general practical value as measurements of urine volume and urine chloride concentration Discussion will be restricted to the value of determinations of plasma sodium and plasma chloride levels since these, especially the latter, are most often used

Normally, sodium and chlorine ions exist in the plasma in the ratio 4 3 in respective concentrations of 139–152 m eq/litre (320–350 milligrams per 100 millilitres) of sodium and 97–110 m eq/litre (340–385 milligrams per 100 millilitres) of chlorine. The estimation most commonly performed, because easiest, is determination of plasma chloride which is then, by old-established convention, expressed as "sodium chloride"—the normal limits being 560–630 milligrams per 100 millilitres

coma *Headache is very frequent* and fainting may occur if the patient stands up sudden [illegible]
vomiti [illegible]
ance [illegible]
pinched up fold does not, on release, return immediately to position Muscular cramps (heat-cramps) may be marked The blood pressure, especially the systolic *pressure, falls In the late stages it may be unrecordable* The pulse is correspondingly weak and usually rapid The blood, owing to haemoconcentration becomes very viscous and will hardly flow into a syringe The blood urea is high The ter [illegible]

In heat-exhaustion the body temperature may be normal, subnormal, or slightly or moderately raised Rarely, sweating ceases altogether and hyperpyrexia ensues

Heat-exhaustion is very much commoner in new arrivals to the tropics and there *is evidence that acclimatization leads to diminution of the salt concentration of the* individual's sweat

When water is not available sweating leads to dehydration due predominantly *to water depletion (primary dehydration) However, this occurs in grave degree* only under exceptional circumstances, such as men lost in the desert, and the pathogenesis is then obvious

TREATMENT

Preventive Treatment

The prevention of all forms of ill effects of heat is first a matter of combating the heat itself This may not be easy and will depend on prevailing circumstances Full discussion is not here possible Important points are (1) Provision of cool *accommodation, if possible installation of an air-conditioned room* per house (small and efficient air-conditioning machines are available) and, again if feasible liberal provision of electric fans (2) Re arrangement of working and travelling *hours, especially for manual workers, so that work or journeys* are done in the cool parts of the 24 hours and the hottest parts of the day are spent resting (3) Suitable clothing, in a hot humid climate, and indoors in any hot climate this *means the minimum compatible with prevailing conventions* Outdoors in dry desert climates more relief may sometimes be achieved by full covering of the body, in Arab fashion, with loose and light white or khaki garments

Heat hyperpyrexia is often associated with the development of an infection [illegible] treatment and anyone ill even [illegible] Disease prophylaxis, especially [illegible] vely organized in regard to all personnel in the area

Heat exhaustion may be prevented by the administration of additional salt Whenever subjects are sweating profusely, it is advisable that salt should be added to all drinking water in the proportion of 15 grains per pint or ¼ ounce per gallon The resulting solution is one fifth the concentration of physiological isotonic saline solution and the salt can barely be tasted This measure is of the utmost importance In addition, salt should be used liberally as a condiment

In severe vomiting and diarrhoea the volume of lost alimentary secretions can exceed a gallon (4 5 litres) in a few hours Indeed, in fulminating cases, such as irritant poisoning or cholera, this volume can be lost during 2 hours Usually, of course, the rate of loss is not so extreme but marked enough For example, a vomit-

as being about 4–5 grammes per litre for vomit or gastric aspirate and 6–7 grammes per litre for secretions derived from the distal side of the pylorus—fistulous exudates

there are usually about twice as many chlorine ions as sodium ions while the con verse tends to apply to fluid lost from intestinal fistulae or by diarrhoea Provided enough sodium chloride is administered to cover the greater ionic loss, the kidneys will sort out any imbalance by excreting the ion which is in excess They can only do so if water intake is sufficient to allow a daily urine output of not less than 3 pints (1,700 millilitres) because although normal kidneys can excrete sodium or

secretions is occurring In practice it seldom need be if the rule is followed of providing for *all* water and salt requirements—that is basic requirements plus secretion losses—by the daily administration of 5 pints (2 85 litres) plus "X" pints

litres) given to cover basic requirements The above rule is remarkably simple and satisfactory in practical application and it will usually be found that the urine chloride remains closely around 3 grammes per litre If the ½ N saline is given intravenously then isotonicity must be achieved by adding 2 5 per cent glucose

Occasionally it may be possible to collect and reintroduce lost alimentary secretions For example, vomit or gastric aspirate may be filtered through several layers of gauze and administered per rectum or through a jejunostomy Such replacement of actual natural secretions is obviously more accurate and complete in all respects than replacement with simple saline solution It is particularly valuable if loss is prolonged over many days or weeks and if the voided juices contain bile If this expedient is followed, the patient must still receive daily 5 pints (2 85 litres) of water and 5 grammes of salt to cover his basic requirements

Restoration of balance (*remedial treatment*) —When a patient has actually become dehydrated he is definitely ill and may indeed be so bad as to be a desperate emergency The first point to determine and it is vitally important, is whether he is

to occlusion of sweat ducts with keratin plugs Main symptoms are feelings of weakness, dizziness and loss of appetite There is marked diminution of ability to work and the cases may resemble effort syndrome Dyspnoea may occur The patients do not look ill and are not dehydrated The temperature may be raised one or two degrees *The pulse is full and the blood pressure, especially the pulse pres* sure, is somewhat raised There is no orthostatic fainting and cramps are absent A common feature is polyuria and urine output may exceed two litres daily The total urine chloride is normal but the concentration, due to the diuresis may be low

Preventive treatment lies mainly in the prevention of prickly heat and in the general preventive measures already described The possibility of dysidrotic asthenia is an argument for placing sufferers from severe prickly heat on light work in as cool conditions as can be secured until the skin has recovered

HEAT NEUROSES

neurotic reactions and their possibility should be kept in mind particularly when dealing with unstable debilitated, or alcoholic individuals Common symptoms are headache, weakness, giddiness and fainting The quantitative test for chloride in urine may be very useful in differentiating true from spurious heat-exhaustion

H L. MARRIOTT

Remedial Treatment

Heat hyperpyrexia or heat stroke

The essential treatment is to cool the patient at once and wherever he happens to be Every minute counts and there must be no time lost by transferring the patient to hospital before beginning treatment

The most effective method of cooling a patient is by the evaporation of water

a strong draught must be maintained by relays of men flapping towels or other material in the manner of a boxer s second The rectal temperature should be taken every 10 minutes and when it has fallen to 102° F the cooling should be stopped For the next week the patient should be kept in bed and very closely observed as relapse due to disorder of the heat regulating centre may occur

A useful ancillary measure in the treatment of heat hyperpyrexia is lumbar puncture controlled by manometry with reduction of the pressure to 100 millimetres

of penicillin should be administered intramuscularly

Heat exhaustion

The treatment of heat exhaustion is that of salt depletion secondary dehydration which is fully described in the section on Dehydration (*see* page 526)

OTHER ILL EFFECTS OF HEAT

Prickly Heat

Prickly heat is a skin rash due to profuse and prolonged sweating which very commonly affects Europeans in the tropics and may cause much discomfort The rash is papular or papulo vesicular and when severe may cover almost the whole body The irritating prickling may seriously affect sleep

In the writer s experience the most effective preventive and curative treatment is removal of the sweat by bathing several times a day in water without the use of soap Water removes the sweat but soap removes the skin s protective covering of natural grease and makes it more vulnerable If possible the minimum of garments should be worn (that is the person should be stripped to the waist) to prevent prolonged contact of the body with sweat sodden clothing

Tropical Dysidrotic Asthenia

This condition chiefly appears in the later part of hot seasons in sufferers from extensive and prolonged prickly heat It may cause considerable disability but does not threaten life There is partial impairment of sweating often in patchy areas due

nursing mothers infants and children Thus not only is cheap *milk available but* also cod liver oil and orange juice and priority has been given for eggs Calcium carbonate has been added to the bread and margarine has been fortified by the addition of vitamin A and vitamin D It has been claimed that the reduced incidence of caries shown by this survey is due to the increased calcifying properties of the present-day dietary There is evidence however, that hypoplastic teeth are no more liable to decay than those in which the normal structure is good excepting that the presence of pits and fissures in the enamel surface provides stagnation areas where food may collect and lead to caries

Another factor to be taken into account in regard to the interpretation of the results of this survey is the coincident reduction of the sugar ration in Great Britain This may contribute to the reduced incidence of caries found in the Mellanby investigation Thus Bunting and his co-workers (1936) found that restriction of *sugar not only reduced considerably the Lactobacillus acidophilus count in the*

received support at the conference held in Michigan in 1947 The opinion most generally held at the present time as to the cause of dental caries is that the enamel of the tooth is first attacked by acid producing organisms which grow on the surface of the tooth in traces of carbohydrate debris which form a plaque adherent to the enamel Caries is mostly observed in the occlusal fissures (natural depressions in the grinding surfaces of the teeth) at the contact points of the teeth and *in later* life when the gums recede, in the exposed cementa This localization of caries supports the view that where there are facilities for the harbouring of food and for *the growth of organisms dental decay is most likely to occur*

Fluorine

The caries inhibiting property of drinking water *which naturally* contains not less than one part per million of fluorine is now established beyond doubt although as Weaver (1948) showed in the investigation in North and South Shields the *reduction in caries incidence is not actually permanent* but is a postponement for approximately 3 5 years Nevertheless as caries in *the teeth of children* is mostly observed in the temporary molars and during the eruptive and post eruptive period of first permanent molars a postponement of caries is of positive value

In the United States of America fluorine deficiency is being met partly by the addition of fluorine to the drinking water and partly by the topical application of fluorine to the teeth The results of adding fluorine to the drinking *water are* still awaited but several reports on the effect of the topical application of fluorine suggest a reduction of caries incidence by as much as 40 per cent

DENTAL SEPSIS

Definition and Pathogeny

Any inflammatory condition, whether acute or chronic, which affects the teeth or their supporting structures is included in the term dental sepsis The sepsis may be closed as in an apical abscess or open as in parodontal disease The term paro dontal disease includes all open inflammatory conditions of the supporting structures of the teeth When the infection is superficial and confined to the gingival margin it is called gingivitis The process is one of inflammation leading to ulceration which is at first superficial, but the gingival sulcus is soon deepened and the infection spreads down the lymphatics of the periodontal membrane towards the apical attachment of the tooth With deepening of the gingival sulcus and suppuration of the periodontal membrane the term pyorrhoea alveolaris is used The

cavity in a tooth down the pulp chamber where it sets up a pulpitis to the apex Thus a pulpitis may lead to an acute peri apical abscess which presents on the alveolus, alternatively, the pulp dies and a chronic apical granuloma develops In the second event the whole process may be symptomless

Prophylactic Treatment

The prevention of dental sepsis depends on a knowledge of the aetiology of dental caries and parodontal disease

DENTAL CARIES

Aetiology

Heredity

The fact that the members of some families are especially prone to dental caries suggests a constitutional factor It may be, however, that the prevalence of dental sepsis in these families is due to environment, habits of living and nutritional factors, rather than to an inherited susceptibility to caries

Nutritional factors

The calcification of teeth depends chiefly on an adequate supply of vitamin D, calcium and phosphorus It has been shown experimentally that a deficiency of

proportion of children free from caries increased by 13 2 per cent, and the proportion of deciduous teeth which were carious decreased by 9 8 per cent The improvement in the 1945–47 period is shown to have been greater than that of the 1943–45

For cleaning the teeth a hard tooth brush should be used and preferably one in which the bristles are set apart The teeth are brushed with a rotary movement

night According to the spacing of the teeth dental silk or a wooden toothp ck should be used to keep the inter dental spaces clear of food debris

MAL OCCLUSION

Traumatic occlusion is prone to develop in irregularities of the teeth moreover in some cases of mandibular retrusion or maxillary protrusion the gum itself is directly injured by the opposing teeth The correction of this mal occlusion will be a decisive measure in reducing the tendency to parodontal disease that is present in these cases

Mouth breathing also tends to produce mal occlusion and in addition may lead directly to gingivitis as a result of dessication of the teeth and gums It promotes the formation of tartar and a marginal ging vitis confined to the anterior teeth is characteristic of the youthful mouth breather Thumb-sucking possibly by altering the shape of the upper jaw and hard palate may be a minor cause of mal occlusion

MOUTH BREATHING

In view of the fact that mouth breathing and the open mouth habit impair the nutrition of the gingivae of the incisors and pre molars of both upper and lower jaws and may lead to gingivitis and mal occlusion the correction of the open mouth habit is highly important

Mouth breathing may be initiated by any permanent or temporary blockage of the nasal airway or it may for a variety of reasons be established as a habit where the nasal airway is patent or has been rendered patent In this connexion it is well to remember that very many children who are labelled as mouth breathers because the mouth is constantly

these cases it would seen

Warwick James and I

failure of muscular control they drew attention to the fact that failure of the anterior oral sphincter results in loss of negative pressure in the mouth so that the mandible unsupported by atmospheric pressure tends to take up a backward position and is held there by the weight of its attached structures Th s results in the impaired action of the moulding forces of the muscles of the tongue cheeks and lips with the possible exaggeration of the deformity by the lower lip becoming trapped behind the upper teeth

Ballard and Gwynne-Evans (1948) believe that mouth breathing frequently occurs in the absence of nasal obstruction and that it is primarily due to the fall ng away of the tongue from the soft palate assoc ated with an incompetence of the lips or failure of the oral musculature to keep the mouth closed at rest These authors correlate the failure of the oral sphincter and abnormal ties of swallow

PROPHYLACTIC TREATMENT

Based on the above knowledge and opinion prophylactic treatment consists of (1) a reduced intake of ultra-refined carbohydrate such as sugar, macaroni, spaghetti and finely divided breakfast cereals, in contrast to whole meal bread, coarse oatmeal porridge and whole-grain cereals, (2) the provision of an abundant supply of vitamin D, calcium and phosphorus, (3) the prevention of food stagnation at the

tunity

PARODONTAL DISEASE

AETIOLOGY

Dietetic factors

The physical nature of the food has a profound influence on the production of parodontal disease As Fish (1944) has pointed out, the gingivae are largely protected against insult, bacterial and traumatic, by the integrity and degree of keratinization of the epithelial attachment to the tooth Fibrous food (roughage)

occurred, the clinical crowns are often shortened to a degree which is comparable with the gum recession of later life The spaces between the teeth in which food is likely to pack are therefore reduced and the incidence of traumatic occlusion (abnormal biting of the teeth resulting in excessive stress and strain on the supporting tissues) is minimized In this connexion, it is noted that the ideal filling material for decayed teeth would be one which wears down at the same rate as the normal tooth substance.

Parodontal disease has, in the past, been attributed to a deficiency of vitamins

PROPHYLACTIC TREATMENT

The dietetic treatment of parodontal disease is the same as the prophylactic treatment of dental caries (*see* above) The same principle holds good in respect

and children should not be fed on soft pappy food longer than is necessary For older children, food that requires mastication is good for the health of their teeth and gums Their diet should contain plenty of roughage (whole-meal bread, fruit

forms on teeth at the gum margin and below, it needs to be removed by scaling the teeth at regular intervals

retained in position by its bulk To be worn comfortably the closed mouth position must be maintained and the only serious disadvantage of the screen is that for purely orthodontic purposes there may be contra-indications to its use However,

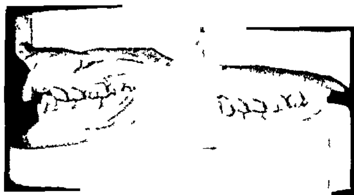


FIG 23 —Models of mouth of patient shown in Fig 22 before and after wearing an oral screen

as a simple and reliable method of restoring nasal breathing, the closed mouth position, or in preventing thumb-sucking in those children who will successfully wear it, the screen is most effective (Figs 22 and 23)

The Andresen appliance (Fig 24)

The Andresen appliance falls into a slightly different category This also is constructed of plastic and is virtually a hollow cast of the closed oral cavity with the



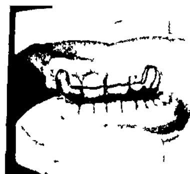


FIG 24 —Different views of the Andresen appliance showing its size and position it will occupy in the mouth

with a persistence of immaturity of muscular development Thus where the facial musculature is insufficiently mature to maintain a closed mouth position at rest or the lips remain persistently apart mouth breathing may exist independently of nasal obstruction

TREATMENT

The treatment of both mouth breathing and the open mouth habit assuming that the nasal airway is patent is primarily directed towards obtaining closure of the anterior oral sphincter Exercises presented in the form of games help in restoring tone to the mimetic muscles and in re-establishing muscular patterns In addition general breathing and postural exercises by helping the patient to walk erect with the chin forward lead directly to a closed mouth position



(a)



(b)

F C 47

n ght

More reliable however are two appl ances the oral screen and the Andresen appliance Both these appliances are worn mainly at night and their effect is therefore obtained at a subconscious level—a matter of great importance in the young child

Oral screen

The oral screen which has been in use for many years is an appliance now fashioned in plastic which is made to fit between the alveolar arches and the lips and cheeks Its action is directly to seal off the oral cavity from the outs de and to restore the negative pressure in the mouth When the screen is inserted into the vestibule of the mouth it stands away from the molar teeth but remains in close contact with the mucous membrane of the cheek It is loose-fitting and is only

The best local drug therapy is hydrogen peroxide applied on wisps of cotton wool or introduced from a syringe with a special needle (lacrimal duct cannula) Penicillin will be referred to later Chromic acid is not advised because it forms a dry slough underneath which organisms grow in an almost anaerobic medium In cleaning up the inflamed gums every effort must be made to do as little damage as possible to them Tanning agents and local dressings are not advised Normal saline solution is the best mouthwash for the patient to use When the acute stage of the disease is passed, local treatment can be more intensive and gum pockets more thoroughly cleaned At this stage, the patient himself can contribute by massage of the gums, by cleaning his teeth with a tooth brush and by using a wooden toothpick in order to keep the inter dental spaces clear and to press down the gum margins

Drug Therapy

Most of the pathogenic mouth organisms are sensitive to penicillin, but few are sensitive to the sulphonamide drugs Vincent's infection is penicillin sensitive and this generally holds good for the streptococcal infections of the mouth When possible, in acute ulcerative stomatitis the bacteriology should be established with a view to determining the drug sensitiveness of the infecting micro-organisms but there is no need to delay the administration of penicillin until the laboratory findings are known Penicillin should be given at once In the early stage of a Vincent's infection when the ulceration is superficial, a remarkable improvement is obtained by the use of topical penicillin (penicillin lozenges, 500 units in each) The patient puts 2–4 lozenges into the mouth every 3 hours The lozenges are retained in the buccal sulci where they slowly dissolve Much of the acute inflammatory reaction subsides within 24–48 hours Incidentally, penicillin lozenges [illegible] which recovers

prevent re infection from the deeper areas to which penicillin has not [illegible] in adequate concentration, penicillin should be given by intramuscular injection [illegible]

patient is allowed up and the more vigorous local treatment [illegible] undertaken, in the dental surgery or in hospital

DENTAL EXTRACTIONS

Adults

Okell and Elliott (1935) have shown that a transient bacteraemia tends to occur in the extraction of teeth affected by parodontal disease Later, Round, Kirk [illegible] (1936) demonstrated a bacterial shower in certain cases of paro

teeth in normal occlusion The appliance fits accurately but loosely and is retained in position by the intermittent action of the oral musculature To be worn comfortably the lips must be closed, with an automatic re-establishment of nasal breathing Gwynne Evans believes that an added advantage of the appliance is that the child, *being given an artificial closed oral cavity is provided with the necessary peripheral* stimuli to cause the proper utilization of the oro facial musculature and that out of this will grow a mature muscular pattern

GINGIVITIS AND PYORRHOEA ALVEOLARIS

Bacteriology

There is still doubt whether parodontal disease is primarily due to a Vincent's infection, to a streptococcal infection of a viridans or haemolytic type, or to a virus infection as yet unrecognized The fusiform bacillus and spirochaete of Vincent's infection are symbiotic and they can be found in most mouths irrespective of the presence of parodontal disease In the more chronic forms of parodontal disease they are almost always present in association with streptococci and pus cells

[illegible]

coccal infection of the tonsils or fauces It may be, therefore, that the primary infection is streptococcal, and it is in support of this view that epidemics of streptococcal gingivitis and stomatitis are reported in the literature

Predisposing Causes

The more important general predisposing causes are states of over fatigue, whether physical or emotional, subnutrition and perhaps a vitamin deficiency Local causes are of equal importance These have already been discussed in

[illegible]

disturbance being an aetiological factor A simple gingivitis in some women has been noted as cyclical in its exacerbations In pregnancy it may flare up into a

[illegible]

in this connexion that some cases of stomatitis and sore tongue in women may be cured by giving stilboestrol

Local Treatment

The treatment of acute Vincent's infection depends chiefly on local measures, namely the removal of slough the clearing of calculus and the cleaning out of gum pockets combined with atomization (for instance 10 per cent hydrogen peroxide in a fine spray)

The best local drug therapy is hydrogen peroxide applied on wisps of cotton wool or introduced from a syringe with a special needle (lacrimal duct cannula) Penicillin will be referred to later Chromic acid is not advised because it forms a dry slough underneath which organisms grow in an almost anaerobic medium *In cleaning up the inflamed* gums every effort must be made to do as little damage as possible to them Tanning agents and local dressings are not advised Normal saline solution is the best mouthwash for the patient to use When the acute stage of the disease is passed, local *treatment can be more intensive and gum pockets* more thoroughly cleaned At this stage, the patient himself can contribute by massage of the gums by cleaning his teeth with a tooth brush and by using a wooden toothpick in order to keep the inter dental spaces clear and to press down the gum margins

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patient is allowed up and the more vigorous local treatment [illegible]
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circulation, either in extraction by the pumping action of the forceps, or in mastication by the movement of the tooth in the socket

Clinically, there are many accounts of cases of simple rheumatic endocarditis, and of congenital heart disease, having been transformed into subacute bacterial endocarditis as a result of injudicious extractions

There is thus in the mouth, in association with parodontal disease or alveolar abscess, a focus of infection which is of the most serious potential import It also acquires further significance considered in the light of preventive medicine No known sufferer with endocarditis should be subjected to a casual extraction in the dental chair In particular, children who have established valvular disease should be admitted for the purpose of extraction and placed under an adequate umbrella of penicillin (At the Hospital for Sick Children the daily dosage is 4,000 units per pound of body weight, administered at 6 hourly intervals for a total of 4–5 days) In addition, the dental surgeon should be at pains to extract the teeth with a minimum of trauma

Apart from bacteraemia dental sepsis may be an important cause of systemic disease Both open and closed sepsis, and particularly closed sepsis such as a granuloma at the apex of a tooth can be responsible for a morbidity out of all proportion to the local significance of the lesion The rheumatic disorders and arthritis are examples of this and so are various forms of allergy There is also the direct relationship of dental sepsis to antral infection and perhaps to infection of the gastro-intestinal tract

Whatever may be the part that focal sepsis plays in systemic medicine it can hardly be doubted that its eradication will improve the patient s health The decision as to whether one or more teeth should be extracted is often difficult to make, and it may require both an experienced dental opinion and an expert interpretation of dental films The treatment of dental sepsis when present by no means necessitates the extraction of every infected tooth Much can be done in the treatment of pyorrhoea by conservative measures, by gingivectomy and by the extraction of impacted and partially buried teeth Dead teeth can often be treated with safety by conservative measures and where root canal fillings and apicectomy have been properly performed there should be little chance of deep-seated infection There is, however, always the mouth where nothing but a complete clearance will have any hope of success and this applies especially to the middle aged and elderly

CHILDREN

The child presents a rather different problem Children on the whole react more unfavourably to sepsis than do adults It is still not uncommon to see children aged 4 years or even younger, with every tooth hopelessly decayed, with multiple abscesses cervical lymphadenitis, loss of appetite and a general condition of toxaemia In this type of case it is unwise to try to conserve the teeth and extractions have to be performed A child thus rendered edentulous, or nearly so, presents a [illegible]

[illegible]

masticating surface, but even if this is not possible, there may be no alternative to a

wholesale clearance of infected teeth, when the infection is widespread and the child is suffering from it As a general rule, dental treatment in children consists of filling carious teeth, and extractions are limited to those teeth in which there is evidence of abscess formation and those in which caries is too extensive to allow of

anaesthetics will probably allow for the completion of the immediate treatment and as a long-term policy, particularly from the psychological aspect, full anaesthesia has much to recommend it.

The most effective treatment of dental sepsis, however, is its prevention as outlined in this article The public require education as to the care of children's teeth and adequate provision needs to be made for the regular dental supervision of children of pre-school age

T CRADOCK HENRY

Ballard, C F, and Gwynne-Evans, E (1948) *Dent Rec*, 68, 1
Bunting, R W, Jay, P, Hadley, F P, and Koenhe, M (1936) *J Amer dent Ass*, 23, 846

d, 29, 1552

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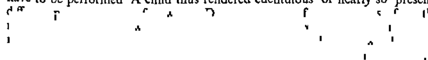
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The child presents a rather different problem Children on the whole react more unfavourably to sepsis than do adults It is still not uncommon to see children aged 4 years or even younger with every tooth hopelessly decayed with multiple abscesses cervical lymphadenitis loss of appetite and a general condition of toxae- mia In this type of case it is unwise to try to conserve the teeth and extractions have to be performed A child thus rendered edentulous or nearly so presents a



masticat ng surface but even if this is not possible there may be no alternative to a

disease because insulin requirement, which at first sight appears to be the obvious criterion, is apt to be misleading on account of the great individual variation in insulin sensitivity A better appreciation of the meaning of severity can be obtained from a consideration of the length of time required for the development of severe ketosis in any diabetic under standard conditions of diet when insulin is withheld By this definition diabetic patients whose disease can be controlled by diet alone without insulin, are less severe than those who require insulin and the highly insulin sensitive case who needs only a small dose of insulin but rapidly develops severe ketosis when insulin is withheld, is rightly considered more severe than the more resistant case who may require more insulin but may be less liable to develop ketosis Adopting this definition of severity, diabetics will be subdivided from the point of view of treatment into two main groups, mild and severe the former requiring diet without insulin and the latter diet with insulin the degree of severity in the latter varies within wide limits

MILD DIABETES

Patients with mild diabetes mellitus include a large number, usually over 50 years of age and equally distributed between the sexes in whom the classical symptoms of thirst and polyuria may be absent or so mild that the disease has often been present months or even years before it is discovered Loss of weight and lassitude are common symptoms, and the diagnosis may be made on these or as a *result of routine examination of the urine for insurance or for some other purpose* More rarely the occurrence of some complication such as retinitis neuritis or gangrene may lead to the discovery of the diabetes These patients however, if left untreated long enough or if attacked by an intercurrent infection are liable to develop ketosis and give the temporary appearance of severity They are normally sensitive to insulin but seldom require it for the ordinary purpose of maintenance

... middle

... stic

... les

cribed in our text books, but is familiar as the *diabète gras* of the French literature These diabetics are typically obese the distribution of fat being suggestive of pituitary dysfunction, they seldom complain of thirst and never develop severe ketosis, however long they are left untreated *Pruritus vulvae* is a common, and may be the only symptom referable to hyperglycaemia and the complications

diabetes responds well to a low carbohydrate low ...
mild diabetes is described below under the heading of Diet without Insulin

SEVERE DIABETES

... infancy to the very
, and loss of weight
dual, but there is a

DIABETES MELLITUS

DEFINITION

Diabetes mellitus is a disorder of metabolism of unknown aetiology in which there is persistent hyperglycaemia due to failure in the proper production or utilization of insulin it is commonly associated with excessive thirst, polyuria and progressive loss of weight

HEREDITARY FACTORS

Little is known at present of the aetiology of diabetes mellitus and the onset of the disease cannot be prevented The importance of heredity however, is generally recognized Pincus and White (1933) and others in the United States of America

more complex While opinion on the exact nature of the part played by heredity is

of diabetes in both parents must be considered a valid reason for advising against pregnancy, and a strong family history on both sides definitely increases the probability of the transmission of the disease, especially if one parent has diabetes

OBESITY

author's opinion, is unjustified in the present state of ignorance of the factors concerned in the causation of diabetes

PRINCIPLES OF TREATMENT

Instances of the cure of diabetes have been recorded, but they are so rare that, for all practical purposes, it is true to say that at present there is no known cure

In therapeutics, as in other branches of medicine, there is a tendency towards standardization but in no disease does treatment more need to be adapted to the individual or do results more depend on the appreciation of this fact than in diabetes

at wh ch to test for s gar The a m of treatment

TYPES OF INSULIN

Three insulin preparations are in general use in Great Britain, *soluble insulin* (S I), protamine zinc insulin (P Z I) and globin insulin (G I) Before considering the properties of these preparations and the ways in which they may be used, the technique and complications of the injection of insulin will first be described

INSULIN INJECTIONS

The syringe

The syringe should be of the glass and metal (Record) or all glass type, graduated as shown in Fig 25 The word "units" should not appear on the syringe as it is likely to produce confusion *It is convenient to keep the syringe in 75 per cent in*dustrial spirit in a spirit proof case

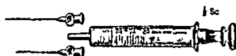


FIG 25 —The Record syringe with 1 cubic centimetre divided into 20 sub-divisions

The needle

The needle should be of stainless steel, the gauge varying between No 17 and No 20, according to the individual preference

Loading the syringe

The cap of the phial should be cleansed with spirit and an amount of air injected into the bottle equivalent to the volume of insulin to be withdrawn The phial should be held with the cap downwards, care being taken to see that the point of the needle is covered by the insulin, and the prescribed number of units drawn into the

syringe and then the P Z I, care being taken not to introduce any air The S I should be drawn up first so as to avoid the danger of inactivating the acid S I with the buffered P Z I It is important to remember that, using the type of syringe

Site of injection

When injections are made by the patient the best sites for injection are the outer aspects of the thighs, the buttocks, and the lower abdomen Some patients can inject into their upper arms, but this site is more suitable when the injection is made by another person

general tendency to develop ketosis which in the absence of adequate treatment becomes progressively more severe until diabetic coma supervenes Insulin sensitivity is variable but usually is a marked feature in infancy and childhood The treatment of severe diabetes is described on page 559 under the heading of Diet with Insulin

TREATMENT BY DIET WITHOUT INSULIN

In those very mild diabetic patients whose glycosuria tends to clear during the night without treatment adequate control of the disease can often be obtained by a simple form of qualitative reduction in the carbohydrate content of the diet Saccharin should be substituted for sugar jam honey marmalade cakes pastry potatoes puddings and cereals should be excluded the intake of bread should be restricted to 8 ounces a day and fruit fresh or stewed should be subst tuted for sweets Beer and mineral waters are forbidden but spirits and dry wines are allowed in moderation in all other respects the diet may be unrestricted and the patient may take full advantage of the extra two rations of meat and fat and 12 ounces of cheese now allowed to diabetics In the absence of severe complications such as

Method of Dieting

tative unweighed d et gave results as satisfactory as those obtained when the patients were taught to weigh their food The chief reason for this is that most patients are willing to keep to a diet they can understand which allows them to live a normal life and does not draw attention to the fact that they suffer from diabetes mellitus the converse is equally true A convenient form of diet is shown in Table I

the value of the diet It would be wrong to conclude that scales have no place in the

means of adding to his vocabulary of foods as well as of checking up on the visual method of dieting given in Table I

Arrangement of Diet

When treatment is by diet alone without insulin the carbohydrate food should be evenly distributed over 3 or 4 meals the total amount allowed vary ng according to

sion to hospital

In deciding whether a diabetic patient can safely be treated as an out-patient, the most important single factor is the presence or absence of ketosis Ambulatory treatment should be confined to those diabetics in whom ketosis, as judged by Rothera's nitroprusside test, is absent or slight, and is likely to give the best results

to the fasting level A diet of 120 grammes of carbohydrate is prescribed for a week,

ing procedure is adopted

Type of insulin and initial dosage

patient For young children and those dependent on others for administration of insulin, a single injection method has obvious advantages and should be tried first, the same is true in those patients who are strongly opposed to taking insulin or who are very needle-shy Occupation is important, because P Z I alone or mixed with S I is more suitable for those whose work allows of regular meals than for those in whom shift work or some other cause of variation in the daily routine makes regular meal times impossible, for the latter patients 2 daily injections of S I are usually a better method of treatment Intelligence should be assessed when prescribing mixed injections of insulin, because the technique of administration and adjustment of dosage are more difficult than with a single injection of P Z I or with 2 injections of S I *As soon as it is decided that insulin is necessary,* the carbohydrate content of the diet should be increased to 150–180 grammes, according to the individual requirements of the patient, further increases in carbohydrate to 200 or 250 grammes can well be postponed until some degree of control of the diabetes has been achieved

Morning and evening S I—Injections should be made before breakfast and before the principal evening meal, and the diet should be so arranged as to give the ... It is wise to introduce a buffer of ... l biscuits, bread, chocolate ... ia before lunch, a similar buffer may be required in the late evening

Suitable arrangements of carbohydrate for the various types of insulin therapy are given in Table II It is usually safe to start with 12–16 units before breakfast

The injection

The skin of the appropriate site should be cleansed with spirit or ether and the needle introduced at an angle of 45 degrees to the horizontal Care should be taken to see that the needle passes through the skin into the loose subcutaneous tissue and

embark on what is often a prolonged and unsuccessful search for the missing

to use soap and water for cleansing before injection

Local reactions

show this tendency should reduce the volume of insulin by using the U80 strength should avoid frequent injections into the same site and should take care to make

a tumour is apt to be poorly absorbed

AMBULATORY STABILIZATION WITH INSULIN

In the absence of ketosis the initial stabilization can usually be satisfactorily

should always be given at bedtime to *minimize the risk of nocturnal hypoglycaemia* (*see* Table II) The initial dose should be from 12 to 20 units and, in view of the cumulative action of this type of insulin, should not be increased for at least 2 days The dose can then be adjusted from the result of a *Benedict test on the specimen* passed immediately before breakfast, the bladder having been emptied on rising

clinical condition, including weight, is satisfactory and the noon blood sugar *estimation does not exceed 180*, there is no need to add *S I*, but if this figure is exceeded in two consecutive determinations, better control can only be obtained with safety by adding S I to the morning injection An attempt to reduce this blood

its use have already been mentioned The carbohydrate of the diet should be fairly evenly distributed throughout the day, with rather larger allowances at breakfast

should be
the case
until the
ing given,
ses of S I
moderate

severity 12 or 16 units each of S I and P Z I are a suitable initial dose and subsequent adjustment of the S I can be made from the noon blood sugar estimation or equivalent urine test, and of the P Z I from the second morning specimen When a mixed dose is used, there is often a period of heavy glycosuria after the evening

Insulin It is less suitable than P Z I for single injection ...
used successfully in combination with S I for morning and evening injections in some difficult cases It is apt to produce severe hypoglycaemic reactions either before lunch or in the late afternoon and, in the author's opinion, has only a limited use in the modern treatment of diabetes

most cases should be kept 4-8 units less than the morning dose, but it can be

help to overcome this difficulty When larger morning doses of 40 or more units of S I are required, the maximum action tends to be delayed, and the urine should be tested before tea instead of after lunch, the blood sugar level will also be at its lowest at about this time.

Morning S I and evening S.I and P Z I—The use of this arrangement of insulins was described by Lawrence and Oakley (1944) and must be regarded as a modification of the above method, it is particularly well suited for use in those severe cases

and, if the mixed injection is given before tea, a better degree of control can often be attained in cases of severe diabetes by this method than by any other Enough

TABLE II

ARRANGEMENTS OF CARBOHYDRATE FOR TYPES OF INSULIN THERAPY

	S I	P Z.I.	P.Z.I. + S I	G I.
Portions per day	18	15	18	15
Breakfast	→ 5	→ 4	→ 5	→ 4
11 A M	2	—	1	1
Midday meal	4	3	4	4
Tea	1	3	3	3
Evening meal	→ 5	3	3	3
Bedtime	1	2	2	—

1 portion = 10 grammes carbohydrate
Arrows indicate times of insulin injections
S I = soluble insulin, P Z I = protamine zinc insulin, G I = globin insulin

P Z I should be given to keep the early morning specimen free of acetone bodies, but the fasting blood sugar should not be made too low or it will be impossible to give a sufficiently large dose of S I before breakfast to act throughout the day, without serious risk of producing mid morning hypoglycaemia This method of control has proved particularly valuable in the treatment of pregnant diabetic patients and children with very severe diabetes

Protamine zinc insulin—Patients with relatively mild diabetes mellitus whose disease cannot be adequately controlled by diet alone are best treated with a single morning injection of P Z I With this form of treatment the carbohydrate content of the diet should be evenly distributed throughout the day and about 20 grammes

indicating a state of medical emergency which, unless promptly and adequately treated, may lead to diabetic coma

KETOSIS

The onset of ketosis tends to be gradual and to be associated with those condi

Of these causes gastro-enteritis deserves special mention, because it stands high on the list of causes of diabetic coma, not only because of the association in this disease of infection, starvation and dehydration, but also because it is not uncom-

nausea, vomiting, abdominal pain and drowsiness When one or more of these symptoms are present the ferric chloride test is often positive and the stage of clinical ketosis or pre-coma has been reached The rate of progress from pre-coma to diabetic coma may be very rapid, and the importance of treating ketosis before this stage is reached cannot be over-emphasized If every diabetic with severe *ketosis were regarded as a potential case of diabetic coma and appropriately* treated before the onset of symptoms, the incidence of this most dangerous, but usually most preventable, medical emergency, could be greatly reduced

TREATMENT

Symptomless ketosis

When ketonuria is the only evidence of ketosis, treatment depends to some extent upon whether the patient is already undergoing insulin treatment and, if so, on the type of insulin used and the arrangement of doses As a general rule any diabetic patient who shows heavy ketonuria should be given insulin and, if the ferric chloride test is positive, it is wise to start with morning and evening injections of S I The size of dose will depend on the age of the patient and on the severity of the disease as judged by its duration, the height of the blood sugar level and the response to diet if this has been tried, in adults, however, it is usually a waste of

half

but

d be

taken into account when assessing the initial dose of insulin

increase both

injection

be given

before the midday meal until the diabetes is again controlled If the diabetes was previously controlled by one injection of P Z I it is worth while trying first the effect of adding to it some S I and testing a specimen of urine passed at about 6 p m , if this shows heavy glycosuria, a small dose of 10–20 units of S I

STABILIZATION IN HOSPITAL

It is important to remember that, no matter what form of insulin therapy if a patient is stabilized at rest in bed, the return to a more active mode of almost certainly result in a fall in insulin requirement and hypoglycaemic re unless a suitable reduction in insulin is made at the time of Apart from the added speed and safe tage is the opport and poss

LOW

W all types and arrangements of insulin, one of the chief difficulties likely be encountered is lowering of the renal threshold, this should be suspected whe atisfactory clinical improvement and repeatedly normal blood sugar levels ar associated with persistent glycosuria If this lowering occurs a specimen of urine should be tested half an hour before and another half an hour after a noon blood sugar estimation so as to determine the approximate level of blood sugar at which sugar appears in the urine, if this is done whenever a blood sugar estimation is made the required information will usually be obtained without the trouble of carrying out a series of synchronous blood sugar estimations and urine tests For example, if the bladder is emptied completely at noon, the blood sugar at 12 30 p m is 140 milligrams per cent and the specimen at 1 p m contains 2 per cent of sugar, it can be assumed that the renal threshold is definitely lowered and is probably between 100 and 140 milligrams per cent If the threshold is not much below 140 it is safe to aim at keeping the after-lunch or before tea specimen green to Benedict's test, but with threshold values of less than this it is wise to ignore glycosuria and to adjust the insulin from blood sugar estimations The patient should be taught to carry out the nitroprusside test for acetone bodies as a precautionary measure against serious relapse

HIGH RENAL THRESHOLD

This is more rare but less important than lowering of the threshold level and is most often seen in elderly diabetic patients in whom the disease has been present for a long while

ROTHERA'S TEST AND GERHARDT S TEST

The description given of the use and arrangements of diet and insulin applies to diabetic patients without severe ketosis and, before the treatment of cases with this omplication is considered, brief reference must be made to the significance of othera s nitroprusside test and Gerhardt's ferric chloride test for diacetic acid he nitroprusside test is very sensitive and gives a positive reaction to diacetic acid dilutions up to 1 400,000, the ferric chloride test, on the other hand, is relatively ensitive and reacts only to dilutions of up to 1 2,000 It follows therefore that, n testing for ketone bodies in the urine, the nitroprusside test should be per- ned first and, if this is strongly positive, the ferric chloride test should also be ed out The presence of a positive ferric chloride reaction must be regarded as

dose of insulin will depend on the colour obtained by testing a 4-hourly specimen of urine with Benedict's solution, and is prescribed in the space provided It is impossible to be dogmatic about dosage of insulin, but *in a diabetic of moderate* severity and of average insulin sensitivity it may be of the order of 28–40 units for a red or yellow test, 12–20 units for a thick green and 0–8 units for a blue, the use of a small dose of insulin in severe diabetics, *even when the urine is sugar-free, often* prevents a serious relapse by the time the next test is made If 20 grammes of carbo

ketosis

Dehydration may be a marked feature in pre-coma, especially if this condition has been brought about by continued vomiting, and should be treated simultaneously with the ketosis In the absence of repeated vomiting the less severe degrees of dehydration may be corrected by 2-hourly fluid feeds alone or with the addition of water by mouth between feeds, but before adopting this method of treatment it is a good plan to wash out the stomach with a weak solution of sodium bicarbonate Severe dehydration with a low or falling blood pressure and decreased ocular tension, to mention only two of the more important signs, should be treated by immediate intravenous saline infusion as in established coma, the rule being when in doubt give fluid intravenously Much valuable time may be lost and recovery may be delayed, if not jeopardized, by trying to give fluids orally to severely dehydrated pre-comatose diabetics, such efforts are liable not only to prove ineffectual but to produce vomiting and so aggravate both the dehydration and the ketosis

No less important than the treatment of ketosis and dehydration is that of the underlying cause of the condition Mention of this has been left until last because, in most cases, such treatment must necessarily follow the institution of the measures already described, while in the comparatively few instances in which this is not so,

Diabetic coma

Diagnosis of diabetic coma should only be made when there is actual loss of

also the risk attached to moving the patient It is impossible to lay down hard and fast rules for every case, but certain considerations are of special importance in reaching a decision which may mean *life or death to the patient* Obviously the home conditions, availability of doctor and nurses and proximity of a suitable ... the most decisive single

and P Z I should be treated in the same way; first by the addition of S I before the evening meal and, if this fails, by the use of three or more injections of S I

Pre-coma

In pre coma a state of emergency exists and it is wise to discontinue delayed action insulins and to rely entirely on multiple injections of S I It is helpful to have

EMERGENCY DIABETIC TREATMENT

Diet and Insulin Control by Urine Tests

Diet Carbohydrate grammes

10 g C or	Glucose	⅓ oz
	Sugar	2 large lumps
	Orange juice	4 oz
	Milk	7 oz
	Benger s	2 level teaspoons
	Horlicks	2 heaped "
	Ovaltine	2 very full "

Bread measure = 10 g C (¾ oz)

Insulin Test urine for sugar before each dose, passing catheter if necessary
Give insulin hourly at

If Benedict's test is	*Units*	*Marks on syringe*
Red or yellow = + + + sugar		
Green with copper deposit = Trace		
Blue = O		

Chart results

Date	Time	Urine Sugar	Ketones Fe or R	Insulin given	Carbohydrates given as	Remarks

Fig 26—Lawrence s Emergency Sheet

some standard scheme which can be readily understood by the nurse or other person in charge, and which can be instituted with a minimum of delay, such a scheme has been worked out by Lawrence and is called by him "The Emergency Sheet" (Fig 26)

Soluble insulin is given 4-hourly at times recorded on the sheet with carbohydrate 2-hourly in one or more of the suitable forms listed on the Emergency Sheet The

cent For a poor response of 100 milligrams per cent or less, 80 units should be injected, and for a satisfactory fall of over 100 milligrams per cent, 50 units or less, according to the level of the blood sugar Subsequent dosage can be worked out in the same way from regular blood sugar estimations taken in conjunction with the results of 4-hourly tests for sugar and ketone bodies in the urine, a catheter being allowed to remain in the bladder for this purpose As soon as ketosis has been significantly reduced the patient's sensitivity to insulin is likely to increase, and the dose of insulin must be correspondingly reduced so as to avoid hypoglycaemia The later stages of treatment are identical with those described under pre-coma, the [illegible]

coma No mention has been made of the treatment of diabetic coma without blood sugar control, as this should be necessary only in exceptional circumstances The general principle is the same, but the dosage of insulin must be decided by the results of 3-hourly or 4-hourly urine tests taken in conjunction with the patient's clinical condition In the early stages ketonuria is more helpful than glycosuria, which will be persistently heavy, the quantitative value of the ferric chloride and [illegible]

Recently there has been a tendency to treat cases of diabetic coma and even pre-coma with doses of insulin much larger than those suggested above, and good results have been claimed for the use of as much as 100 or even 200 units given at hourly intervals in the early stages of treatment While it is possible that these very large doses may be of advantage in desperate cases with profound circulatory collapse, they are certainly not necessary in the stage of pre-coma or in most ordinary cases of diabetic coma, and, if used, the danger of their producing hypoglycaemia should be minimized by careful blood sugar control The potassium content of the blood has recently been shown to fall in some severe cases of diabetic coma, and it has been suggested that a low blood potassium level may be one of the causes of death in this condition The administration of potassium to such cases is claimed to reduce the mortality rate, but it is as yet too early to pass judgment on this new form of therapy

As in pre coma, the drainage of local collections of pus, if it does not involve major surgery, should be carried out as soon as possible, major operations should be postponed until the patient is out of coma A state of drowsiness may persist for many hours after ketone bodies have disappeared from the urine and tachycardia may also be present for several days, the latter is probably due to myocardial intoxication and should be treated by complete rest It has been suggested that the cardiac condition may be the result of vitamin B_1 deficiency, and daily injections of 50 milligrams of this vitamin have been advocated for its treatment

HYPOGLYCAEMIA

[illegible] symptoms and signs of hypoglycaemia make their [illegible] gher than 60 milli [illegible] e is a time relation

vel, the possibility of improving the patient's condition before moving him must
e seriously considered The best way of doing this is to give a moderate dose of
40–60 units of S I and a rapid intravenous infusion of 2 litres of normal saline
solution, after which the patient will often be able to stand the journey to hospital
without the fatal fall in blood pressure which is liable to take place if this pre-
paratory treatment at home is not carried out.

On admission to hospital the patient should be put into a warmed bed and kept
warm with an electric blanket, all other methods are more dangerous and less
effective, hot-water bottles, unless suitably protected, being particularly liable to
produce burns in diabetics The foot of the bed should be raised and the patient's
blood pressure recorded, the cuff being left in position for subsequent readings at
hourly intervals A catheter specimen of urine should next be taken and examined
for sugar, ketone bodies and chlorides, and a sample of blood for blood sugar
estimation While all this is being done 80 units of S I should be injected, 20 units
being given intravenously if there is marked circulatory collapse, and an intravenous
drip set up, if possible into an arm vein and without cutting down The reason for
this is that in the writer's experience infusion of glucose solution often causes
phlebitis when given into an ankle vein, especially if a cannula is tied in

Opinion differs as to the best solution for intravenous infusion in the early
... abetic coma, but normal saline solution is probably the most satis-
... s dehydration, haemoconcentration and chloride loss
... e use of glucose solution, of masking the
... ately absent from the urine,
... reappear.

st

f

The first ...
dehydration is very se...
which the rate of flow should be cut ...
begins to show a definite fall it is wise to change over ...
fifth normal saline solution, and to continue with this solution until the ...
down If the blood pressure continues to fall the substitution of plasma for salin
solution will sometimes prevent death from peripheral circulatory failure and
always worth a trial

By the time the drip is set up the initial blood sugar level should be known a
the insulin dosage planned accordingly If the figure exceeds 1 per cent a furt
100 units may be given at once, if it is between 750 and 1,000 milligrams per c
60 units may be given, but if less than 750 milligrams it is probably better to w
hold insulin until the result of a second blood sugar estimation is available
should be taken 3 hours after the first so that the level may be known in time t
insulin 4 hours after the initial injection The dose of insulin then given will d
on the response to treatment in the first 3 hours, and the importance of kn
this constitutes the chief reason for giving saline solution rather than g
intravenously over this critical period The tendency for the intravenous f
lower the blood sugar level by dilution should be allowed for in assess
response of the blood sugar to the insulin already given If, at the end of
the blood sugar estimation equals or exceeds the original figure, but is less th
cent, a further 100 units should be given, 80 units intravenously and 20 u
cutaneously, this dose should be doubled if the blood sugar estimation exce

out of coma in a few minutes If sterile glucose solution is not available and coma is not too deep 15 minims of 1 1 000 adrenaline may revive the patient sufficiently for sugar to be given by mouth posterior lobe extract has a similar action in raising the blood sugar level but is slower and unsuitable for pregnant diabetics A solution of glucose or sugar may be given by means of a stomach tube or nasal catheter the

watched for evidence of a relapse A small number of cases of profound and

to damage to the brain

Whenever there is the least doubt about the cause of coma in a diabetic it is a *safe rule always first to give glucose without insulin if coma is due to hypoglycaemia* rapid recovery is likely to result, and if it is diabetic, no harm will be done

THE TREATMENT OF DIABETES IN CHILDREN

Diabetes mellitus is rare in the first 5 years and very rare in the first 2 years of life Treatment is essentially the same in children as in adults but good control is more difficult to obtain and maintain for the following reasons

(1) dietetic difficulties,
(2)
(3)
(4)
(5) intercurrent infections such as the exanthems often complicate the diabetes

Domestic and educational problems require special consideration and the reaction of the child and its parents to the disease have to be taken into account

DIET

Diet should be adequate to satisfy the appetite and to provide for normal *activity and growth Infants are best treated* by allowing milk feeds and other suitable foods in the amount normal for their age and balancing these with an adequate dose of insulin (*see* page 573) This method has the advantage of simplicity but, in practice it is always necessary to have the infant in hospital to assess insulin

ment n children of between

alone is sufficient to differentiate between hypoglycaemic and diabetic coma in almost every case in which an accurate history can be obtained The early symptoms are due to the secretion of adrenaline and include palpitations, sweating, tremor, restlessness and excitability The low blood sugar level is commonly associated with intense hunger and, by virtue of its action on the central nervous system, may produce a state of mental confusion, incoordination, ataxia, paraesthesia, especially in the lips and tongue, transient palsies, drowsiness, coma, convulsions and rarely death To this list may be added nausea and headache, which are most commonly produced by P Z I Coma is usually preceded by one or more of the early symptoms which, although many and varied, fortunately tend to be stereotyped in individual diabetics This enables coma to be prevented by treatment at the onset of the attack in all but the comparatively rare cases in which loss of consciousness occurs almost or completely without warning, such patients may be discovered in coma without obvious evidence of its causation

Prophylactic Treatment

Frequent attacks of hypoglycaemia mean bad diabetic treatment, and often

Treatment of the Attack

a general tendency on the part of diabetics and those treating them to give too little carbohydrate, especially in attacks due to protamine zinc insulin, with the result that either the attack is not relieved or it recurs after a brief interval of im-

the great majority of diabetic children should not only enjoy a happy childhood but also grow up into healthy and useful citizens

PREGNANCY AND DIABETES

During the first trimester the only difficulty likely to be met with in the manage

trimester and is due to a fall in the renal threshold for sugar, this results in more or less constant heavy glycosuria and prevents control of the diabetes mellitus by urine tests As soon as this happens *the carbohydrate content of the diet should be* raised to compensate for the loss of sugar in the urine, which may be so consider able that, if this precautionary measure is not taken, quite severe ketosis may develop as a result of inadequate carbohydrate oxidation In the great majority of cases the insulin requirement increases during the latter half of pregnancy and the tendency to develop ketosis on a morning mixed dose of S I and P Z I or morning and evening injections of S I often make it better to change over to morning S I and a mixed dose of S I and P Z I before tea or the evening meal, this arrangement seems to suit most pregnant diabetic patients very well A small minority of patients *will be found to need no extra insulin, and in some there is a progressive fall in* insulin requirement during pregnancy

important means of reducing the

tors, the nature of

cy has been given

w that a disturb-

ance in the normal hormone balance is the principal cause of foetal death has led

n the later stages of preg

labour The best results, in the author's experience (Oakley and Peel, 1949) Caesarean section at the thirty sixth or thirty seventh week, but, if there has been a previous normal delivery, induction at the same stage of gestation may in favourable *circumstances be advised It is wise to employ* some method of induction which allows of Caesarean section being carried out, if necessary, during labour

Following delivery, no matter what method is used, there is a marked fall in insulin requirement which normally lasts a few days but may, in exceptional cases be considerably more prolonged Starting as soon as possible after birth, the baby should be given hourly feeds of glucose solution to prevent the fall in blood sugar level which is always liable to occur, and may even be a cause of neonatal death *The incidence of congenital deformities is* somewhat higher than normal and accounts for a small number of foetal and neonatal deaths

SEPSIS AND GANGRENE

Carbuncles and boils are common in uncontrolled diabetic patients and their treatment is the same as in non diabetics, with the addition of the measures necessary to stabilize the diabetes

normal as poss ble and although sugar and sweets are best excluded allowance should be made for the inclus on of such youthful fancies as cake ice-cream jellies and biscuits

INSULIN

Here again it is important to consider what can and what cannot safely be achieved w th insul n in the treatment of juven le diabetes F rst and foremost t must be realized that it is impossible in most cases to keep the urine sugar

case of morn ng S I and before breakfast w th P Z I The importance of determ n ing the best times for urine tests in any case s one of the many reasons why it is essential to stab l ze d abetic children n hospital An even more important cons der

increased unt l ketonur
s ngle inject on régime
be used and increased
having been empt ed on rising is sugar free or nearly so If heavy glycosuria

d sease to change over to morning S I and a mixed inject on of S I and P Z I before tea in the manner already descr bed

In chronic cases it may be possible to deal with the condition in one operation, but this should not be undertaken until the diabetes is in good order

SURGERY

Minor Operations

Diabetics need no special preparation for local anaesthetics Operations requiring only a brief general anaesthetic such as nitrous oxide or thiopentone may be carried out without much alteration of the diabetic régime The usual insulin and diet may be taken up to the meal immediately preceding operation, this should consist of the carbohydrate portion only in the form of a glucose drink and should precede the operation by not less than 2 hours in order that the stomach may be empty at the time of administration of the anaesthetic

Major Operations

In acute abdominal and other emergencies requiring major surgery the most

internal haemorrhage in which immediate operation is essential, surgery should be combined with the treatment of pre-coma described above

In all other circumstances the diabetes should be controlled by diet and by two injections of soluble insulin before a major operation requiring a general or spinal anaesthetic is carried out

Anaesthesia

The best anaesthetics for a diabetic are those which have no toxic actions on the liver, allow of a rapid return of consciousness and do not tend to produce post-operative vomiting By this definition chloroform and ether should be avoided, the former on account of its toxicity and the latter for its liability to cause post-operative vomiting Thiopentone, nitrous oxide and oxygen, cyclopropane, curare and spinal anaesthetics are all suitable, and may be combined with local anaesthesia

The detailed arrangement of diet and insulin will depend to some extent on the time of the operation If this is arranged for the early morning, rather less than the

of S I followed by the carbohydrate portion of breakfast in the form of toast and marmalade and a further 30 grammes of glucose drink 2 hours before operation For operations in the latter part of the day no change in the normal routine should be made until the midday meal, which should consist of a glucose drink A second injection of rather less than the usual evening dose of S I should be given 2 hours before operation with a further 30 grammes of glucose drink It is a good rule, whenever possible, to give a pint of 5 per cent glucose solution as a rectal drip when the patient returns to the ward

WILFRID OAKLEY

Lawrence, R D, and Oakley, W G (1944) *Brit med J*, 1 422
Oakley, W G and Peel, J H (1949) *Transactions of the 12th Congress of Obstetricians*

SEPTIC LESIONS

ISCHAEMIC LESIONS

Evidence of ischaemia is not confined to the lesion and will be found in the atrophic appearance of the skin, which is often shiny and may be slightly pink or cyanosed, in absent dorsalis pedis pulsation and in poor oscillometer deviations The foot may be generally painful and burning or there may be a localized area of gangrene affecting one or more toes Less commonly the gangrenous area may extend up on to the dorsum of the foot, in which case there is usually no alternative

an all important consideration, the toe may be amputated, the patient having been previously warned that the wound may not heal

When the local lesion is more extensive and involves some part of the foot proximal to the phalanges, it is almost always best to amputate without delay Good results have been obtained in such cases from a circular flap amputation about 6 inches below the tuberosity of the tibia the edges of the wound being approximated with a Vaseline gauze bandage, but not sutured (Silbert, 1944) The advantage of this method is that it preserves the knee, a consideration of particular importance in a disease which is always essentially bilateral

SEPTIC AND ISCHAEMIC LESIONS

The combination of septic and ischaemic lesions is the one most characteristically diabetic a fact that has led to the erroneous belief that diabetic gangrene is always septic

make it easier to decide upon the type and extent of surgical treatment necessary

idiosyncratic tendency to be worse in one or other season, and it may give trouble

tion, and of these the last is the most constant Occasionally headache is a dominant symptom, possibly due to obstruction in the ostium of a sinus followed by absorption of some of its contained air and a suction effect on the mucosa It may also perhaps be reflexly produced from peripheral sensory stimulation in the oedematous muc

getting out

and the nas

from those due to irritative or infective chronic sinusitis The important points apart from the usually characteristic history are (1) No pus can be seen either in the nasal cavities, even after shrinking the mucosa with adrenaline, or in the nasopharynx, (2) the mucous membrane is either pale and sodden or crenellated suggesting a shrinkage from a former sodden condition, and (3) microscopic examination of the secretion will reveal, characteristically, eosinophils and also lymphocytes and plasma cells Pus cells are few, if present at all

X-ray examination of the sinuses is not only of no help but may actually prove misleading if the clinical condition is not clearly borne in mind A skiagram shows only a shadow, and any extra density cast by the lining mucosa of the accessory sinuses may be due either to fluid, hyperaemia or fibrosis Fluid may be present

events, a proof puncture should settle the matter

TREATMENT

General

The postulates already made as to the origin of the condition as well as the actual pathological changes in the affected organ must be remembered in the management of these cases To some extent treatment is empirical, but certain specific measures are available *In the application of these principles it is first of all important to keep the* bodily and mental health at as high a pitch as possible This demands attention to

ld be restricted and there must be a good

of 100 milli

vitamin con

ic acid up to

must be taken

daily and *continued for some months*

A shortage of calcium or of potassium has been considered partly responsible, and, accordingly, the oral administration of calcium gluconate tablets (2 grammes)

EAR, NOSE AND THROAT DISEASES

ALLERGY

INTRODUCTION

Allergy is a term used to denote hypersensitivity of certain tissues to various substances The substances are usually proteins but may be inorganic for example certain drugs and may be brought into surface contact with the tissues or be carried in the blood stream after ingestion The reaction itself is specific and takes the form of increased capillary permeability with an exudation of fluid into the tissues to

allergen produces a reaction between it and the antibody releasing a substance similar to or in fact histamine which in turn acts on the capillaries The reaction may occur locally in the sensitized tissues or in the blood stream and in the latter case the substances produced circulate in the blood until they reach the sensitized tissue where they then release the histamine compound The ultimate clinical condition produced may be rhinitis asthma hay fever urticaria intestinal or renal spasm or migraine

In addition to the allergen a constitutional factor is necessary for the occurrence of these reactions or they would occur in everyone This factor is probably in

of some nervous upset or mental fatigue Endocrine imbalance is a subsidiary factor in these conditions of reflex autonomic disturbance Finally sudden variations of temperature as well as changes in habitat often provoke the onset of a reaction

th

all

organ in the body concerned with protein reduction and synthesis In this way allergy may be considered an inborn error of metabolism in the same category as for example alkaptonuria

DIAGNOSIS

Nasal allergy is an extremely common malady quite apart from the allied but seasonal disorder of hay fever It is perennial although there is often an

not of the same chemical group, is Thephorin It has a great tendency to induce

uuceu as t e symptoms improve until finally administration is discontinued These antihistamine drugs can be exhibited at any time an acute phase begins Meanwhile the measures previously advised should be continued Histamine desensitization which seems a logical method of attack has on the whole proved disappointing

Other local measures such as zinc ionization cauterization and the injection of sclerosing solutions are all destructive and illogical in their *point d appui* and they are not to be recommended

The eradication of any focus of infection is essential Vaccines made from cultures of pus from such foci have been advised and certainly benefit often follows the use of these vaccines

PROTEIN SHOCK THERAPY

This introduces the wider question of protein shock therapy which should be tried if other measures fail If the postulate of an error of metabolism is valid

metabolic cycles need not be vastly different to be effective It is on this account that protein shock treatment may be given and may be successful The writer believes that this is the process which actually occurs in many instances in which vaccine or desensitization treatment gives good results A simple method of protein shock is the intramuscular injection of blood drawn off from a vein—autohaemotherapy When symptoms are acute small quantities of blood from

there is no result Occasionally this treatment will unmask a previously unsuspected septic focus and a tooth will suddenly begin to ache revealing an apical abscess or the tonsils may become acutely inflamed

Finally of course if polypi have formed and are obstructing the nasal passages they must be carefully removed but this is a task for a specialist

Although localized to a small area it can be seen that nasal allergy is a deeply seated condition requiring the most careful and comprehensive examination and evaluation

GRANULOMATOUS INFECTIONS

TUBERCULOSIS

At one time tuberculous ulceration in the pharynx and nasal passages was not uncommon but it is now rare The diminution in incidence is proportionately

3 times a day (or 10 millilitres of a 20 per cent solution intravenously with an equal quantity of sterile saline solution once a week) and 0 5 gramme of potassium chloride 5 times a day have both been advised There is no good evidence for these beliefs

Stuffy rooms as well as sudden changes of temperature should be avoided so

patients will be found to suffer from either flatulence or constipation or both This possibly can be regarded as a function of hepatic derangement and a useful method of treatment is the administration of 8 16 millilitres of a 25 per cent

These relatively simple measures often markedly improve the condition and even although the nasal symptoms may persist to some extent the patients frequently spontaneously remark on a general improvement in well being

LOCAL

Various intranasal preparations are advised and they are well advertised They all depend upon the inclusion of vasoconstrictor and astringent substances and

the product on of a round-cell infiltration and fibrosis A condition of chronic

allow the use of one of these preparations the last thing before retiring It may be reinforced with a barbiturate such as Nembutal or Soneryl

MYCOSES

All the mycoses are rare, and those with any clinical history at all are actinomycosis, blastomycosis and leptothricosis. Ulceration to a greater or lesser degree is the usual lesion and occurs chiefly in the pharynx. The *future treatment of all these* infections will probably be with streptomycin or an allied drug.

SCLEROMA

Scleroma is an unusual disease endemic in Poland, from which country it is slowly spreading. It may be contagious and is thought to be due to a diplobacillus observed by Frisch. A submucous infiltration begins in the nose and around the lips, gradually extending backwards into the pharynx. Fibrosis follows without suppuration and finally hardens into a dense, keloidal mass of cartilage like consistency. In this tissue the organism is found and also the large vacuolated cells of Mikulicz.

Treatment

Apart from irradiation with radium or x rays, which has occasionally been successful, nothing can be done. If the disease spreads back to the larynx and hypopharynx, surgical measures to preserve the patency of the food and air passages *may be required*.

TUMOURS

As in the case of tumours elsewhere, the benign ones may cause symptoms because of their site or size and they should then be removed.

Malignant tumours must be diagnosed and submitted to surgical or radiological treatment as soon as possible. All forms of ulceration should be considered suspect until a precise diagnosis is made and this must not be delayed. A blood stained nasal discharge should also arouse suspicion especially if unilateral. On the whole malignant tumours in this area, chiefly squamous-cell epitheliomas, are fairly amenable to treatment in the early stages and are horrible in the later ones. *This* lays a heavy responsibility on the physician, when faced with any of these conditions, to ensure a speedy diagnosis by a reference to a specialist opinion.

PYOGENIC INFECTIONS, ACUTE AND CHRONIC

INTRODUCTION

The mucous membrane of the upper respiratory tract is exposed to both air borne and food borne bacteria. Repeated invasion by these organisms results in a

and is also aggregated in several discrete masses known as the [illegible] geal tonsils, or more commonly the tonsils and adenoids. With the passage of time, and presumably a lessening in activity, the tissue gradually diminishes in amount

greater than the decrease in general incidence of the disease This is probably because ulceration in these areas usually occurs with a pulmonary involvement and relatively late in the natural history the more effective control and treatment of pulmonary cases is thus the important factor

The diagnosis rests on the physical appearance of the ulceration on the presence of lesions elsewhere or on biopsy

TREATMENT

LUPUS

Ulceration due to lupus sometimes occurs in and around the anterior nares It is now a rare condition

TREATMENT

ful radiological clinical and laboratory observation are necessary

SYPHILIS

This has become even more rare than tuberculosis and lupus Primary chancres may occur on the lips or tongue Secondary manifestations take the form of shallow ulceration of the pharyngeal mucous membrane of snail track ulcers or of mucous tubercles near the corner of the mouth inside the cheeks or along the margins of the tongue The tertiary lesion is the gumma which may occur as a lump in the tongue or more usually as an ulcer with a deep sloughing base and sharply defined and somewhat undermined edges these ulcers are found anywhere in the pharynx or nasal passages

The diagnosis is made on the appearance of the lesion on serological examination of the blood or on biopsy

TREATMENT

There is no special local treatment of syphilitic lesions in these regions beyond local cleansing measures if necessary (*see* under Venereal Diseases)

fibrous tissue and may lie dormant in a vegetative condition or become active as a result of some stimulus There is evidence that organisms penetrate the nasal mucous membrane and come to lie between the periosteum and bone or even in the bone itself

DIAGNOSIS

Acute infections

Acute tonsillitis is characterized by local pain swelling hyperaemia and exudate usually accompanied by cervical adenitis general prostration and fever of varying degree

Acute rhinitis is a sequel of a common cold and is considered to be established when after 5 or 6 days the serous discharge is gradually replaced by a muco purulent one There are usually no other symptoms or physical signs

Acute sinusitis is virtually the same condition as that above except that it in [illegible]

[illegible] be more on an [illegible]

dull

but

this may be small in amount and occur entirely as a postnasal drip The elucidation *of this physical sign requires some practice in anterior and posterior rhinoscopy* Transillumination is an old but valuable method of investigation chiefly of value *if there is a positive finding of unilateral loss of translucency Good x ray* examination is usually conclusive and may reveal disease unsuspected even after *transillumination Fluid levels often occur (Fig 27) and are best shown by taking* photographs with the head tilted It must be stressed that the technique of these *examinations is exceedingly difficult and no reliance should be placed on indifferent* films The amount of general disturbance varies enormously from case to case and is *by no means necessarily an index of the extent of the disease The disturbance is* always greater if drainage is hindered or blocked and ultimately it is a function of the virulence of the causative organisms

All these infections may be complicated in various ways and the complication may outlast the primary cause and *outweigh it in importance Thus the invading* organism may be (a) Blood borne giving rise to suppurating foci in almost any site in the body the most usual being the middle ear, kidney joints endocardium pericardium meninges intracranial venous sinuses and brain (b) Lymph borne to the cervical glands or middle ear *(c) By direct spread into the cellular tissues of* the palate neck orbit or neighbouring bony structures or to other parts of the respiratory tract

Chronic infections

[illegible] The most certain way of diagnosing chronic tonsillitis is a [illegible]

and extent the adenoid for example has usually disappeared by the end of adolescence

There are other accessory defence mechanisms in the nose The epithelium itself and the glands in the corium secrete mucus which clothes the whole of the nasal cavities and sinuses as a continuous thin sheet in which are embedded the cilia of the surface epithelium These cilia move concertedly shifting the mucus in each sinus through the ostium until it reaches the nasal cavities and from there into the nasopharynx whence it is swallowed Thus bacteria which adhere to the sticky mucus are swept into the alimentary canal and destroyed In addition the mucus itself contains substances of some antibacterial potency

The upper respiratory tract is thus equipped to deal with acute or chronic in fections in the following ways

(1) The normal vascular mechanism of inflammation and repair
(2) The phagocytic action of lymphoid tissue
(3) Ciliary action in the nasal cavities and accessory sinuses
(4) Antibacterial nasal secretions

There is nearly always especially in the nose a preceding virus infection of the mucosa Usually this is the common cold but it is occasionally influenza one of the

virulent characteristics or they may be introduced from without The haemolytic streptococcus staphylococcus pneumococcus *Micrococcus catarrhalis* and *Haemo philus influen ae* are those usually identified They proliferate and diffuse in the sub mucous layer along the lymphatic or vascular networks Infection is sometimes introduced from neighbouring diseased areas such as carious or septic teeth The

co stitute the typical catarrh of nasopharyngeal infections

When the nasal mucous membrane is chiefly affected the resulting condition is known as rhinitis if the nasal cavities bear the brunt or sinusitis if one or more accessory air sinuses are involved Tonsillitis occurs if the lymphoid tissue becomes infected In any site an acute infection may pass through all the pathological phases of inflammation and repair ending with complete resolution but factors such as the character and virulence of the invading organism the quality of the local and general defences or the facility for natural drainage of secretions may

permanent changes are produced in the tissues These latter changes follow from the primary one of formation of fibrous tissue which is a normal end result of an inflammatory process This fibrosis in the nasal and sinus mucous membrane occurring chiefly in the submucosa modifies its functions by interfering with its vascular supply and consequently its glandular elements Both in this membrane and in the lymphoid tissue organisms may be retained in pockets formed by

chronic inflammatory process, namely, general ill health, arthritis, fibrositis and various forms of allergy In addition, the *presence of such a focus of infection* predisposes towards recurrent attacks of acute infection in the site itself and also

It is said that certain psychoses develop from chronic infection of the posterior sinuses, especially the sphenoids

TREATMENT

PREVENTIVE

The preventive treatment of these infections is largely a matter of segregation,

so rigorous a measure as segregation In fact, it is probably true to say that a large proportion of cases of acute tonsillitis or sinusitis may never be seen by a doctor, but run their whole course untreated, and this also applies to a lesser extent to the chronic conditions The physician may in certain instances be able

respiratory tract infections which may be checked by suitable advice regarding

discontinuing the smoking of tobacco lessens the congestive or catarrhal condition of the mucosa and perhaps its sensitiveness to infection Often a chronic focus *of infection is present possibly quite unsuspected, in one tonsil* or sinus or tooth root, tending to facilitate recurrent acute infections, such a tendency is also occasionally seen in cases of nasal obstruction due to anatomical defects or adenoidal overgrowth

CURATIVE

The organisms responsible for the acute infections are fortunately usually sen

[illegible] and often to both If the facilities for identi

The optimal concentration in the mucous membranes *requires the syst*[illegible] tration in an adult of 1,000,000 units of penicillin daily, at 4-hourly intervals if using the sodium or calcium salt in water, or one injection night and morning of procaine penicillin It may not be convenient to give *these frequent injections*, and some patients, especially children, quickly come to loathe them Sulphonamides should then be given The most useful in their action against the various bacteria

Persistent enlargement of the deep cervical glands at the level of the angle of the jaw indicates that infection is passing through the tonsil to the next line of defence and is a most valuable physical sign



Chronic sinusitis—This is chiefly confused with allergic changes The chief points to remember are that pus is present in a chronically infected sinus and not in allergy careful examination or sinus lavage will reveal the presence of pus A good radiological examination is again of great help and should include films of the upper teeth It may be extremely difficult to determine the precise sinuses involved but this is a specialized matter for the rhinologist

Complications of chronic infections

inserted into one corner of the mouth while the head is held over a large bowl The fluid is pumped into the mouth and collected in the bowl This method can be used with small children who are unable to gargle or cleanse their throats

Warm applications to the neck such as a pack of warm wool or an electric pad are useful if adenitis is of any extent These are preferable to cold compresses because they stimulate the blood flow and hence assist the inflammatory reaction

Acute sinusitis

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processes Ciliary action is the natural method of drainage of the sinuses and nasal cavities In abnormal circumstances this mechanism may fail because of the viscidity of the secretions or occlusion of the sinus ostia either by turgescence of the mucous membrane or with fibrinous material A traditional method of assisting the natural process is the inhalation of medicated steam A useful prescription (60 minims of which should be used in a pint of steaming water) is given below

Menthol	10 gr	0 6 g
Benzoic acid	5 gr	0 3 g
Tincture of tolu	20 min	1 2 ml
Industrial spirit	1 fl oz	30 ml

Friar's balsam which is a very ancient remedy, has the disadvantage of soiling everything with which it comes into contact and benzoic acid is preferable on this

Various decongestive or vasoconstrictor drugs have been freely used as intranasal drops or sprays both to relieve the nasal obstruction, of which the patient generally complains bitterly and to ventilate the sinuses Most of these drugs are too powerful in their action and the temporary relief they confer is followed by a reactionary congestion In addition, they nearly all inhibit ciliary activity to some extent Proetz (1941) and others have shown that the most useful of these drugs and the one least harmful to the cilia is a 0 5 per cent solution of ephedrine in normal saline solution which should be used after the steam inhalation sprayed from an atomizer or dropped into the nose from a pipette with the head in a dependent position and fully extended The vasoconstrictive effect is not severe but lasts an

service

and in their relative lack of toxicity to the patient are sulphathiazole and sulphadiazine An adult should be given 8 0 grammes on the first day and 6 0 grammes daily thereafter at 4 hourly intervals All antibiotics should be used early in the disease and in full doses to obtain the best results and should be continued for at least two days after the major symptoms have subsided Sulphonamides and penicillin appear to have a synergic action when given together and in any severe case of acute tonsillitis or acute sinusitis they should each be administered in the same doses as when given separately (For more details of this form of treatment *see* Antibiotics page 18)

The fibrosis of chronic infection interferes with the blood supply and this is probably the reason why antibiotics are of little practical value once the chronic stage has been reached It would be unreasonable to expect them to get rid of the fibrosis and they may also be powerless to reach the infecting organisms inaccessibly placed in fibrous tissue

REMEDIAL

The acute infections are often very mild attended with little general disturbance and the slightest of local discomfort Acute tonsillitis for example may cause nothing more than a sore throat for two or three days and acute sinusitis may be considered merely a heavy cold On the other hand either can be an extremely prostrating illness accompanied by the most unpleasant local symptoms The general toxaemia is treated by rest hygiene diet mild purgation diaphoresis and antibiotics already sufficiently discussed in this and other articles

Acute tonsillitis

The pain and discomfort in the pharynx are the predominant local symptoms

both a local and general analgesic action and can be given every 4 hours Other local remedies for the pain are lozenges of carbolic acid in ½ grain quantities and the insufflation of a powder containing Orthoform and Anaesthesin in equal parts

the pain Dover s powder in doses of 5 or 10 grains is invariably successful and also assists diaphoresis

The thick and viscid salivary secretion is best broken up and expelled by warm or *hot gargles of glycerin and thymol This is a fragrant and soothing preparation in* contrast to the alkaline lotions which are unpleasant to the taste and often prove nauseating

secretion is persisting in spite of the conservative measures already enume

belong to the province of the rhinologist but undoubtedly a few washo appropriately timed in the right sort of case may be the turning point and le rapid resolution There seems to be no advantage in using any fluid other sterile normal saline solution Sulphonamide drugs or penicillin in solution been advocated and it has been affirmed that leaving such a solution in the helps in overcoming the infection There is no evidence that these drugs are abs in any bulk through the surface epithelium into the submucosa where the inflammatory reaction is occurring whereas they are known to be locally irr In addition when used in this way they may penetrate into the mucosa thr small surface erosions and sensitize it leading to allergic reactions It is pro wisest to avoid their use in this manner and to rely upon their systemic adn tration Puncture and lavage is also sometimes necessary as a diagnostic me in certain cases when the symptoms and radiology indicate a focus of infection physical signs are absent

Surgery—Surgery has no place in the treatment of uncomplicated acute sinu

if these same measures are carefully and persistently employed There is perhaps exception Occasionally infection in the antra seems to persist in mild degr

secretions either by lavage or suction through a cannula

Chronic sinusitis

In this condition the mucosa has already become so modified by fibrosis drainage is necessarily impaired by the discontinuities in the ciliary and m sheet The methods of assisting resolution and drainage already described

disease process under control The symptoms of chronic unnoticeable during most of the year and are only prominent in the winter when disease often undergoes an acute exacerbation Nothing more than medical meas on these occasions is indicated in this type of case

SURGICAL TREATMENT

of two kinds conservative and radical The former lar ntilation of the nasal cavities an ous from such sinuses may also

some cases the outlet of a sinus may be severely obstructed and the accumula-
of secretions then produces the most unpleasant and often agonizing pain
frontal sinuses from the anatomical details of their drainage are most often
ected, sometimes the ethmoidal cells also, and occasionally the sphenoids or
tra The pain occurs with the periodicity already described and is with difficulty
elieved by opiates, but aspirin and codeine blunt its severity and should be given
n this type of case strong vasoconstriction is essential A nasal spray of 2 per cent
cocaine hydrochloride and 0 1 per cent adrenaline in equal parts should be used
immediately before the steam inhalation and ephedrine spray The paralysing
effect on the cilia is only short lived and the shrinkage produced allows the steam
access to the sinus and is subsequently maintained in some degree by the action of
the ephedrine Many people are sensitive to cocaine and it has a strong habit-
forming power It should therefore only be used when absolutely necessary and
discontinued as soon as possible

Short wave diathermy and x rays are useful measures, chiefly to relieve pain
The former is an excellent method of heating tissues in a localized area deep to the
surface even if surrounded by bony walls It can be given once a day The heat so
produced, as well as being analgesic assists in some measure the local inflammatory
reaction Small doses of x rays sometimes relieve pain and can be given every other
day for 3 treatments, preferably early in the disease Again there appears to be an
additional beneficial effect on the inflammatory process If facilities for either of
these modes of treatment are available and pain is severe they should be tried
especially short wave diathermy

Suction displacement —A stage of the disease is sometimes reached when the
invasion is over and the acute pain has disappeared but when localized dull head
ache persists not necessarily centred over any particular sinus but usually frontal
or across the root of the nose, together with a continuing muco purulent discharge
It probably indicates smouldering infection in sinuses not draining adequately
Proetz (1941) has devised a method of treatment known as suction displacemen
which is usually most effective in this type of case The patient is placed supine o
a couch with the head hanging over the edge fully extended Four or five millilitr
of 0 5 per cent ephedrine in saline solution are then instilled into each nasal cav
and intermittent suction is applied to each nostril in turn with the other pinc
shut Meanwhile the patient is instructed to speak the letter 'K' repeatedly,
closing off the nasopharynx from the oropharynx The effect of this manoeuv
to suck air out of the sinuses and replace it with the ephedrine solution For
hours later the ephedrine gradually drains out of the sinus keeping the mucosa
ostium shrunk during this period and facilitating the drainage of secretion
treatment should be repeated every other day for 3 weeks, and a further cou
be given after a week's rest Various pieces of apparatus are used for the
but an early one devised by Proetz consisting of a heavy glass syringe with
rubber suction bulb is simple and effective Quite young children will subm
treatment

Puncture and lavage —From the antra particularly, and sometimes t
and sphenoidal sinuses retained secretions can be removed by punct
trocar and cannula and subsequent suction or lavage Whenever th
vasive stage is over and the symptoms physical signs or x rays i

LOCALIZED ADIPOSITY

Dercum's disease (adiposis dolorosa) is characterized by symmetrical painful deposits of fat on the back of the neck, on the shoulders, arms, trunk or thighs It occurs most commonly in women of middle age and may be associated with generalized adiposity *The cause of the disorder is doubtful, but it has been ascribed to the*

TREATMENT

Endocrine Adiposity

By endocrine adiposity is meant adiposity due to an obvious endocrine disorder Loss of weight may follow the treatment of a pituitary tumour, and the adiposity of

as a result of its use This is true to some extent in Fröhlich's syndrome In the few

hyperinsulinism may be treated by removal of the pancreatic tumour or by partial pancreatectomy

It should be emphasized that anterior pituitary extracts, chorionic gonado-

Reducing diet

Most cases of adiposity require a reducing diet, for in the present state of our knowledge this is the most effective means of decreasing weight Deficient intake of fat and carbohydrate usually results in the withdrawal *of fat from the fat depots*, but only some degree of amelioration can be expected A return to a normal food *intake will be accompanied by a recurrence of increase of weight* The treatment in most cases is therefore only symptomatic, the underlying cause being still present

There are various types of reducing diets but common to them all is the low con-

quent increase of metabolism A reducing diet is usually

should be supplemented with a vitamin concentrate. Since in some cases there is a

about 2 pints a

e next page

used for the preparation of vaccines often helpful if other maladies are present wh ch may be secondary to the sinus disease Radical operations are intended to

a persistence of unpleasant local symptoms general toxaemia due to absorption and any of the diseases in remote parts of the body already mentioned as possible compl cations (*see* page 585) In addition chronic sinus infections especially of the antra may be secondary to dental sepsis which may also require surgical treatment

COMPLICATIONS

cavernous sinus thrombosis are now seldom if ever necessary However the management of such cases remains a difficult problem and one to be handled by a specialist in these diseases

MAXWELL ELLIS

Proetz A W (1941) *Essays on the Appl ed Phys ology of the Nose* St Louis U S A Annals Publ shing Co

DIET

Because of the hypoglycaemia which is often present, the diet should be rich in carbohydrate A low potassium diet, which was once advocated, is not necessary; it is unpalatable and troublesome to prepare A high potassium diet, however, should be avoided, hence foods such as meat, pulses and nuts, which have a high potassium content, should be restricted

SODIUM THERAPY

protect the patient against the ever present danger of a crisis For this reason salt alone is now not usually employed If there is any reason why it should be, it is

ven as

onate

4 grammes, and sodium citrate 4 grammes, throughout the day

SUBSTITUTION THERAPY

The preparations available for the treatment of adrenal insufficiency are adrenal cortical extract and deoxycortone acetate As with other steroid hormones esterification prolongs the action of deoxycortone Cortical extract is supplied in vials containing 10 millilitres and should be kept in the cold Deoxycortone acetate is supplied in 1-millilitre ampoules containing 2 milligrams, 5 milligrams and 10 milligrams dissolved in arachis oil or sesame oil It is given by intramuscular injection Water-soluble deoxycortone glucoside is available for intravenous use in ampoules of 5 millilitres of water containing 50 milligrams of hormone Cortical extract may be given intramuscularly or intravenously, its intravenous administration is rarely necessary, and although allergic reactions rarely occur with a reliable preparation *there is some evidence* that its

actions of

—pain

who is

Deoxy

balance

deoxycortone acetate is more effective in this respect than is extract

to have a specific blood pressure raising effect in patients *with adrenal* insufficiency

er the blood urea when this is raised through impaired

, unlike cortical

n and is sometimes

in its stead The

netabolism are the

The patient may eat as much as he likes of the following

stewed only.
Salad and tomatoes without oil or mayonnaise; and beetroot, radishes, watercress
Fresh fruit of any kind, including bananas.
Sour pickles only (not sweet pickles or chutneys)
Clear soup, broth, Bovril, Oxo, Marmite
Pepper, mustard, vinegar, Worcester sauce (no other sauces) Salt at table should be restricted
Fluids water, soda-water (not sweet mineral waters), tea and coffee (ground) Milk only as mentioned below
Saccharine for sweetening
Half a pint of milk (not condensed) daily.
Half a slice of bread at breakfast only

desired weight has been reached the diet should be increased, but not so much as to cause a further gain in weight Often a modified normal diet may be taken with impunity after reduction of weight has been obtained, but in some patients strict dieting is always necessary.

Thyroid

factory amount of weight Increasing the dose of thyroid is useless and inadvisable, for these patients appear to be resistant to its action In such cases, a starvation day once a week may be tried.

Drug treatment

Diuretics, in combination with a reducing diet, may be of value in patients with water retention The mercurial diuretics, for example, mersalyl, Esidrone,

Some physicians employ dextro-amphetamine sulphate (Dexedrine) or amphetamine sulphate (Benzedrine) in order to decrease the appetite and to induce a sense

in 1 5 per cent saline solution should be
2 litres should be given during the first 1
hours At the same time 50 millilitres of
ously, 10–20 millilitres intramuscularly an
intramuscularly The intramuscular injection of extract or deoxycortone acetate should be repeated at intervals of 4 or 6 hours during the next 24 hours The diet should consist of fluids The dosage of further hormone depends on the patient's condition

SURGICAL COMPLICATIONS

Patients with Addison's disease offer a poor risk to surgical procedures and for this reason operation should be performed only when absolutely necessary Adequate preparation outweighs the urgency of the operation During the 48 hours before the operation 10 millilitres of deoxycortone acetate should be given each day and 10 milligrams of extract 8 hourly On the day of the operation an extra 25 millilitres of extract should be given and repeated after the operation Local anaesthesia should be employed when possible, and failing this nitrous oxide oxygen and ether can be used *It should be remembered that patients are sensitive to morphine and to narcotic drugs*

PREGNANCY

Because of its dangers pregnancy is contra indicated but once established it should be allowed to continue Increased amounts of salt and hormone will be necessary during the early months if there is much vomiting Since labour involves physical stress, the patient should receive the same treatment as for surgical operation

OVERDOSAGE WITH DEOXYCORTONE ACETATE

The chief symptoms of overdosage are due to excessive retention of sodium and to hypertension Sodium retention results in oedema Rapid increase in blood volume may overburden an enfeebled heart and consequently the oedema of heart failure may be superadded In older patients the margin of therapeutic safety is small because of pre-existing myocardial damage For this reason the dosage should be smaller and the implantation of pellets avoided Similar symptoms of overdosage may be produced with cortical extract With both preparations symptoms usually quickly disappear if the hormone is withheld for 48 hours

Severe muscular weakness and even paralysis may be produced with deoxycortone acetate and is associated with a low serum potassium value A patient seen by the writer was completely paralysed in all four limbs and had a serum potassium value of only 6 6 milligrams per cent, the figures for the serum sodium and serum chloride being normal Diagnosis of Addison's disease had been erroneously made and the patient had been treated accordingly The condition cleared up dramatically within 36 hours on the administration of 12 grammes of potassium chloride throughout the day

RESULTS OF TREATMENT

Treatment rapidly improves the patient's general condition, increases his muscular strength and body weight and relieves the gastro intestinal disturbances Pigmentation is less marked, but this is due to filling out of the skin as the dehydration

exceed 5 grammes a day, because if the patient develops an intercurrent infection with nausea and vomiting he will be unable to take the higher dose Instead of deoxycortone acetate, cortical extract may be used, from 5 to 10 millilitres intra-

preparation improvement is apparent in 2 or 3 days

Severe cases should be treated with cortical extract and deoxycortone acetate, especially during the initial stages of therapy The doses depend on the severity of the disease 10 millilitres or more of extract may be necessary 2 3 or 4 times during the 24 hours and 5–10 milligrams of deoxycortone acetate once a day Patients who have hypoglycaemic attacks should also be treated with extract as well as with deoxycortone acetate, since the latter has no effect on carbohydrate metabolism Even in the less severe cases it may be said that whenever the response to deoxycortone is not entirely satisfactory the treatment should be supplemented with cortical extract

The maintenance dose of extract and deoxycortone acetate is determined by ... ight ... the ... ver- ... are usually found to be reduced

Depot Therapy

Once the patient has been balanced on deoxycortone acetate, which usually occupies several weeks, it is convenient to implant pellets of the hormone subcutaneously, the site chosen being either the anterior abdominal wall or the sub- ...

deoxycortone acetate are usually necessary

An alternative method of depot therapy is the intramuscular injection of an aqueous suspension of crystals of deoxycortone acetate It is supplied in ampoules of 2 millilitres containing 50 milligrams of the hormone Being slowly absorbed from the site of injection it exerts its action for about 3 weeks Its equivalent in terms of the oily solution has not yet been estimated so that the dosage must be determined from the effect obtained, 2–4 millilitres of the suspension are usually adequate (for technique of injection, *see* page 650)

ADDISONIAN CRISIS

An Addisonian crisis demands energetic treatment To counteract the dehydration and hypoglycaemia which are usually present, a 5 per cent solution of dextrose

bilateral and often they are situated, not in the adrenal gland, but in the paraganglia along the sympathetic chain and the abdominal aorta They may also occur in the neck, where they arise from the carotid body, and even in the chest Collapse and shock may occur during or directly after operation, it is treated by blood transfusion, adrenaline in oil 1 millilitre intramuscularly, and cortical extract intravenously and subcutaneously in doses as for an Addisonian crisis

Hutchison R (1907) *Quart J Med*, 1 33
Pepper W (1901) *Amer J med Sci* 121 287

ADRENO GENITAL SYNDROME

HISTORICAL NOTE

The earliest case of the adreno-genital syndrome with post mortem findings was published in 1811 by Cooke, a surgeon of Brentwood This was a girl aged 4 years with precocious puberty, hirsuties and a large tumour near the kidney Similar cases were subsequently reported, but it was not until 1903 that the condition was

with an adrenal tumour and proposed the term 'adrenal virilism In 1936 Simpson, de Fremery and Macbeth showed that excess of androgens is excreted by these patients, thus demonstrating that the disorder is dependent on excessive production of androgens by the adrenal cortex

DIAGNOSIS

for
l by
le or
sex

When it arises in intra uterine life it results in female pseudohermaphroditism in children before puberty it results in precocious sexual development (or more correctly, pseudo sexual precocity, because in girls menstruation is uncommon and in boys spermatogenesis does not occur) and after puberty it results in virilism (hirsuties and amenorrhoea) in women and feminization in men In females there is usually an increased urinary excretion of 17 ketosteroids, the degradation products of androgens

TREATMENT

Female pseudohermaphroditism is far more often associated with hyperplasia ... The results of removal of the tumour or of ... e the abnormal development of the ... t as far as possible be improved by plastic operations

disappears and not to actual decrease of melanin The blood pressure rises, but with *extract it may remain low in spite of clinical improvement* The blood sodium and blood chloride levels are usually corrected, but again with extract they may not reach the normal figure, although the clinical condition is satisfactory Whereas before the use of cortical hormone sufferers led a life of invalidism most patients

Addison T (1855) *The Constitutional and Local Effects of Disease of the Suprarenal Capsules* London Highley

Hartman F A MacArthur C G, and Hartman W E (1927) *Proc Soc exper Biol N Y* 25 69

Loeb, R F (1932) *Science* 76 420

ADRENAL MEDULLARY TUMOURS

SYMPATHETIC NERVE TUMOURS

life and earliest infancy The ganglioneuromas usually occur in adults and the neuroblastomas have been reported rarely in adult life

Treatment

Treatment of the malignant tumours is unsatisfactory because they are insensitive to radiotherapy and metastasize too early for surgical removal of the primary growth to be of any benefit A ganglioneuroma, being generally benign can be effectively removed surgically

PHAEOCHROMOCYTOMA

The phaeochromocytoma is a tumour which arises from chromaffin tissue and secretes adrenaline or some allied compound, thus causing paroxysmal or continuous hypertension and the symptoms which result from this These tumours are exceed ingly rare and arise between the ages of 20 and 40 years, occurring with about equal frequency in males and females

Treatment

A hypertensive attack due to a phaeochromocytoma is sometimes relieved by the inhalation of amyl nitrite and coma due to hypertensive encephalopathy should be treated by venesection and lumbar puncture Removal of the tumour results in complete cure, but the operator should remember that sometimes the tumours are

purpura, fever and hypotension In the encephalitic-adrenal type there are in addition mental confusion, convulsions, papilloedema, incontinence and extensor plantar responses. The disease is rapidly fatal

TREATMENT

The treatment should be vigorously carried out as soon as the diagnosis is suspected. The measures adopted are those used in the treatment of a crisis in Addison's disease Shock, dehydration and hypoglycaemia should be combated with warmth and the continuous intravenous administration of a 5 per cent solution of dextrose in normal saline solution. Any adrenal cortical insufficiency which may exist is treated by giving 50 millilitres of cortical extract at once intravenously, 10 milligrams of deoxycortone acetate intramuscularly and, at intervals of 4 or 6 hours, 20 millilitres of cortical extract intramuscularly. These doses should be proportionately reduced for infants and children The septicaemia should be energetically treated with large doses of penicillin and one of the sulphonamides By early treatment on these lines successful results may be obtained

Andrewes, F W (1906) *Lancet*, I, 1172.
[illegible] (1943) *Lancet*, 1, 771

DWARFISM AND INFANTILISM

DEFINITIONS

[illegible] height is below [illegible] sexual [illegible] nt, but statural growth may be within normal limits Ateleiosis, meaning "incomplete", is infantilism due to congenital pituitary insufficiency and is to all intents the same [illegible]

HISTORICAL NOTE

The term "infantilism" was first used in medical literature by *Lorain (1871)* with reference to a tuberculous patient thus affected Lorain's type of infantilism was subsequently ascribed to a degenerative state caused by malnutrition or by syphilis or tuberculosis in the parents In 1908, Lévi connected the condition with *hypopituitarism, hence the eponym* Lévi-Lorain's infantilism Paltauf (1891) gave the first accurate description of the skeleton of a dwarf, subsequently considered by Erdheim (1916) to be a case of pituitary dwarfism In 1902, Gilford used the term

Sexual precocity is more often due to carcinoma than to a benign tumour of the adrenal cortex Unless metastases are present or subsequently arise, removal of

during the post operative period the hirsuties disappears and subsequently menstruation returns When the tumour is malignant, the patient may die through metastatic spread When adrenal hyperplasia is the cause, the removal of one gland or of considerable portions of both, often produces very satisfactory results

order, but as a precaution against the development of post operative adrenal insufficiency it is advisable to institute pre operative and post operative treatment with adrenal cortical extract and deoxycortone acetate as described in the section on Cushing's syndrome (*see* page 612)

Removal of an arrhenoblastoma, if this is the cause, also results in a striking improvement

Apert E (1910) *Bull Soc Pédiat Paris* 12, 501
Broster, L. R (1934) *Lancet*, 1, 830

BILATERAL ADRENAL HAEMORRHAGE

HISTORICAL NOTE

The first case of purpura and bilateral adrenal haemorrhage was described by Voelcker of the Middlesex Hospital in 1894, and in 1901 Graham Little first recognized the condition as a clinical entity In 1906 Andrewes showed that bilateral adrenal haemorrhage might be a complication of meningococcal septicaemia Waterhouse, in 1911, and Friderichsen, in 1918, wrote comprehensive reviews of the disease and as a result the syndrome was named after them in 1933

DIAGNOSIS

The Waterhouse Friderichsen syndrome is a rare condition which occurs in children and in adults, and is due to bilateral adrenal haemorrhage usually associated with acute sepsis In most cases (60–70 per cent) it is the result of a fulminating meningococcal septicaemia, in fact Martland (1944) maintains that all cases are due

types there are general constitutional and gastro intestinal disturbances, cyanosis,

on alternate days or even more often for several years, but the expense, inconvenience

promote union of the epiphyses, treatment of genital hypoplasia with these hormones should be deferred until the maximal effect is obtained with growth hormone.

trophin and (in males) derivatives of testosterone (*see* Hypopituitary Hypogonadism, page 618) *Treatment of ovarian dwarfism with growth hormone or with oestrogens* is unlikely to be effective Since the arrest of growth which ultimately occurs in sexual precocity is due to early closure of the epiphyses, increase of growth cannot *be obtained in this condition If diabetes mellitus in children is treated early enough* they may resume growth at a normal rate

CONCLUSION

are more easily rectified Thus minor degrees of food ...

general ill-health, hypothyroidism, *and so on may be responsible for insufficient* growth and delayed development, which may be corrected by early treatment and

Brissaud, E (1895) *Quoted from Rolleston (1936)*
Erdheim, J (1916) *Beitr path Anat*, 62, 302
Gilford, H (1897) *Med-chir Trans*, 80, 17
— (1902) *Ibid*, 85, 305

Cour Paris

Disease London, Oxford

HORMONES, PROPRIETARY NAMES OF

In the list which follows are given the commercial names of the natural hormones, their derivatives and extracts containing natural hormones The list does not aim at being complete Thus the natural oestrogens, oestrone and oestriol, have purposely been omitted, because they have been largely replaced in therapy by more potent

as well In 1897 Gilford recorded the case of a boy with premature senility associated with immature development and later called this syndrome progeria (Gilford 1904) This is probably a juvenile form of Simmonds disease due to hypopituitarism

AETIOLOGY

The causes of dwarfism and infantilism may be classified as follows

DWARFISM

pygm es

Congenital disturbances of the skeleton —These disturbances may be due to achond oplas a, mongolism and micromelia (shortness of the limbs)

INFANTILISM

It should be apprec ated that a number of the cond tions enumerated below may cause e ther nfant lism or dwarfism

TREATMENT

The treatment of dwarfism and of infantilism is primarily the treatment of the cause if this is possible but the ultimate result may often not be satisfactory In genetic dwarfism nothing can be accomplished and little can be done for dwarfism due to system c d sease Better results may be obtained when dwarfism is caused by nutritional d sease, by chronic infections or by d seases in which there is inadequate absorption for these cond tions can be corrected or improved by dietary measures and appropriate treatment

ENDOCRINE INFANTILISM

Dramat c results are obtained with thyroid in infantilism due to cretinism (*see*

tried 5 millilitres of Antu trin Growth hormone should be given intramuscularly

Hormone Preparation	Proprietary Name	Manufacturer
Parathyroid		
Parathyroid extract	Parathormone	Lilly
	Paroidin	Parke Davis & Co
Adrenal cortex		
Adrenal cortical extract	Eschatin	Parke, Davis & Co
	Eucortone	Allen & Hanburys
	Supracort	Paines & Byrne
	Suprarenal Cortical Extract	British Drug Houses
Deoxycortone acetate	Cortenil	Bayer
	Cortiron	British Schering
	Doca	Organon
	Percorten	Ciba
	Syncortyl	Roussel
Androgens		
Testosterone propionate	Erugon-S	Bayer
	Neo-Hombreol	Organon
	Oxoid Brand Testosterone Propionate	Oxo
	Perandren	Ciba
	Sterandryl	Roussel
	Testosterone Propionate, Boots	Boots
	Testosterone Propionate, B D H	British Drug Houses
	Testoviron	British Schering
	Virormone	Paines & Byrne
	' Wellcome ' Testosterone Propionate	Burroughs Wellcome & Co
Methyltestosterone	Erugon S	Bayer
	Methyl Testosterone, Boots	Boots
	Methyltestosterone, B D H	British Drug Houses
	Neo-Hombreol (M)	Organon
	Oraviron	British Schering
	Perandren Linguets	Ciba
	Tabloid Methyl Testosterone	Burroughs Wellcome & Co
	Virormone-oral	Paines & Byrne
Oestrogens		
Oestradiol monobenzoate	Benzo-Gynoestryl	Roussel
	Benztrone	Paines & Byrne
	Dimenformon	Organon
	Hyploid Oestradiol Benzoate B W	Burroughs Wellcome & Co
	Oestroform	British Drug Houses
	Ovocyclin B	Ciba
	Oxoid Brand Oestrin	Oxo
	Progynon B Oleosum	British Schering
	Unden	Bayer
Oestradiol dipropionate	Dimenformon Dipropionate	Organon
	Ovocyclin P	Ciba
	Progynon D P	British Schering
Ethinyl oestradiol	Estigyn	British Drug Houses
	Ethin Oestryl	Roussel
	Eticyclin	Ciba
	Lynoral	Organon

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Hormone Preparation	Proprietary Name	Manufacturer
Anterior pituitary and anterior pituitary-like hormones		
Chorionic gonadotrophin	Antoxylin S	Oxo
	Antuitrin S	Parke, Davis & Co
	Gonadotraphon S	Paines & Byrne
	Gonan	British Drug Houses
	Physostab	Boots
	Pregnyl	*Organon*
	Prolan	Bayer
Chorionic gonadotrophin plus anterior pituitary follicle-stimulating hormone	Ambinon A	Organon
	Synapoidin	Parke, Davis & Co
Serum gonadotrophin	Antostab	Boots
	Gestyl	Organon
	Gonadyl	Roussel
	Serogan	*British Drug Houses*
Anterior pituitary extract	Ambinon B	Organon
	Antoxylin	Oxo
	Gonadotraphon	Paines & Byrne
Growth hormone	Antuitrin-Growth	Parke, Davis & Co
Adrenocorticotrophin	Cortrophin	Organon
Lactogenic hormone	*Physolactin*	*Glaxo*
Posterior pituitary		
Posterior pituitary extract	Glanoid Pituitary (Posterior Lobe) Extract	Armour
	Infundin	Burroughs Wellcome & Co
	Pitalin	Paines & Byrne
	Pituitary (Posterior Lobe) Extract B D H	British Drug Houses
	Pituitrin	Parke, Davis & Co
	Piton	Organon
Oxytocic principle	Pitocin	Parke, Davis & Co
Pressor principle	Pitressin	Parke, Davis & Co
	Pitressin Tannate	Parke, Davis & Co
Thyroid		
Dried thyroid	Elityran	Bayer
	Tab Thyroid	Armour
	Thyranon	Organon
	Thyroid B P	Paines & Byrne
	Thyroid Gland Tablets	Parke, Davis & Co
	Thyroid Gland Tabloid	Burroughs Wellcome & Co
	Thyroid Tablets, B D H.	British Drug Houses
	Thyroidin Elixir	Allen & Hanburys

When the tumour cannot be found the removal of hyperplastic or normal parathyroid glands produces no permanently beneficial effect If there are any renal calculi these should be removed at a subsequent operation

As a result of the rapid fall in the serum calcium, tetany may occur post operatively This complication may be due to a disuse atrophy of the remaining glands, but is usually temporary As a precaution against this, 30–60 grains of calcium lactate should be given post operatively 3 times a day for several weeks, and the calciferol should be continued for several months

ACUTE HYPERPARATHYROIDISM

Acute hyperparathyroidism is extremely rare, only seven cases having been reported It is caused by an adenoma of the parathyroid glands, but has none of the symptoms usually associated with that condition The clinical picture is one of gastro-intestinal disturbances, drowsiness and widespread visceral and vascular calcification The disease is rapidly fatal, but if it is recognized early and treated promptly, good results may be expected Treatment consists of the withdrawal of a pint of blood from a vein and its replacement by two pints of normal saline solution, followed later by removal of the tumour

Albright, F, Aub, J C., and Bauer, W (1934) *J Amer med Ass*, 102, 1276
Askanazy, M (1904) *Arb path Anat Bakt*, 4, 398
Mandl, F (1926) *Arch klin Chir*, 143, 245
von Recklinghausen, F (1891) ' Die Multiplen Fibrome der Haut ', Festschrift f Rudolf Virchow

HYPOPARATHYROIDISM

HISTORICAL NOTE

The earliest description of tetany was published in 1815 by Clarke, of St Bartholomew's Hospital At the end of the nineteenth century it was thought that tetany was related to thyroid insufficiency because the condition was observed after thyroidectomy The parathyroid glands were considered to be embryonic thyroid tissue This view, however, was later opposed by Kohn (1895) and in 1896 it was shown by Vassale and Generali that parathyroidectomy alone, with the thyroid gland left intact, resulted in fatal tetany In 1909 MacCallum and Voegtlin demonstrated that the parathyroid glands regulate calcium metabolism In 1925 Collip established the existence of parathyroid hormone by preparing an extract which abolished tetany and repaired the metabolic disturbances in parathyroidectomized dogs

AETIOLOGY

Hypoparathyroidism is caused by surgical removal of the parathyroid glands and may arise after removal of a parathyroid tumour when the remaining glands are atrophic It may occur spontaneously and may then be due to haemorrhage, amyloid disease, syphilis, vascular changes or calcification (Levrat and Brette, 1947) It has been described after acute infections It causes a fall in the level of the blood calcium and therefore gives rise to tetany, a condition characterized by prolonged muscular spasms and even by epileptiform convulsions due to increased neuromuscular excitability Post operative hypoparathyroidism is now rare and

Hormone Preparation	Proprietary Name	Manufacturer
Progestogens		
Progesterone	Gestone	Paines & Byrne
	"Hyploid" Progesterone B W	Burroughs Wellcome & Co
	Lipo-Lutin	Parke Davis & Co
	Luteostab	Boots
	Lutocyclin	Ciba
	Lutogyl	Roussel
	Lutren	Bayer
	Progestin B D H	British Drug Houses
	Progestin-Organon	Organon
Ethisterone	Ethisterone Boots	Boots
	Ethisterone B D H	British Drug Houses
	Gestone-oral	Paines & Byrne
	Lutocyclin Linguets	Ciba
	Lutogyl	Roussel
	Progestoral	Organon

PARATHYROID DISEASES

HYPERPARATHYROIDISM

HISTORICAL NOTE

Generalized osteitis fibrosa was first described in 1891 by von Recklinghausen and is therefore sometimes called von Recklinghausen s disease of bone In 1904 Askanazy reported the presence of a parathyroid tumour in this disease, but it was not until 1926 that the first parathyroid tumour was removed by Mandl in generalized osteitis fibrosa with favourable results The condition is rare

DIAGNOSIS

Hyperparathyroidism results from an adenoma of the parathyroid glands and causes generalized osteitis fibrosa (fibrocystic disease of bone), renal calculi,

Bauer, 1934)

TREATMENT

The treatment is removal of the parathyroid tumour For 2 or 3 weeks before the operation the patient should receive a high calcium diet The diet therefore should be rich in milk, cheese and eggs Calciferol should also be given in doses of 50 000 units a day by mouth This treatment is aimed at making good as far as possible the depletion of the calcium reserves Repeated operations may be necessary before the

where it

striking it

increas e

unaffected, but often a previously bedridden patient is able to be up and about.

calciferol The substance is given by mouth In mild cases gradually increasing

since its action is cumulative, there is some danger of overdosage
(For tetany due to other causes, *see* Tetany, page 656)

Clarke, J (1815) *Commentaries on some of the most important Diseases of Children* p 78 London
Collip, J B (1925) *J biol Chem*, 63, 395
17
I, 118

POLYOSTOTIC FIBROUS DYSPLASIA (ALBRIGHT'S SYNDROME)

A syndrome characterized by multifocal areas of osteitis fibrosa, patchy cutaneous pigmentation and, in females, precocious puberty, was described in 1937 by Albright, and his colleagues Falconer, Cope and Robb-Smith (1942) observed the condition in a boy and described other features such as acromegalic manifestations, leontiasis ossea, unilateral exophthalmos, optic atrophy, and en

normal and the disorder is not due to a para
unknown, but it is probably a congenital disturbance of development involving the
(Falconer, Cope and Robb-Smith 1942)

Albright, F, Butler, A M, Hampton, A O, and Smith, P (1937) *New Engl J Med* 216, 727
Falconer, M A, Cope, C. L, and Robb-Smith A H T (1942) *Quart J Med*, 11 121
Lichtenstein, L. (1938) *Arch Surg*, *Chicago*, 36 874

PITUITARY GLAND DISEASES

CUSHING'S SYNDROME

HISTORICAL NOTE

For many years before Cushing wrote on the disorder which bears his name, syndromes of a *so-called pluriglandular type* with the clinical features of Cushing's syndrome had been reported For instance, Achard and Thiers in 1921 described a syndrome characterized by hirsutism, adiposity, amenorrhoea 'hypertension *purpuric striae* and glycosuria which they termed *Diabetes des femmes à barbe* In their cases these authors found pituitary or adrenal tumours at necropsy In 1932 Harvey Cushing of Boston published a paper entitled 'The Basophil Adenomas of the Pituitary Body and their Clinical Manifestations (Pituitary

spontaneous hypoparathyroidism very rare The latter has been described more frequently in children than in adults

TREATMENT

The treatment of hypoparathyroidism consists of the emergency treatment of the acute attack of tetany and the treatment of the chronic state.

Acute Tetany

Since tetany is dependent on the low level of calcium in the tissues, the aim of treatment is to raise the concentration Calcium gluconate, 10–20 millilitres of a 10 per cent solution, is injected, preferably intravenously in urgent cases, but in the [illegible]
recur the injection should be repeated In severe cases intramuscular injections of parathyroid extract (parathormone) in doses of 30 units, at intervals of 6–8 hours, [illegible]

inhalations of chloroform may be required

Overdosage with parathormone

The early symptoms of overdosage are anorexia, nausea and vomiting, and later thirst and drowsiness, which may proceed to coma Overdosage is treated by discontinuing the injections and by lowering the increased viscosity of the blood, caused by the hypercalcaemia, by withdrawing a pint of blood from a vein and replacing it by twice the amount of normal saline solution

Chronic Hypoparathyroidism

Parathyroid extract is not used in the treatment of the chronic state, mainly because its administration becomes ineffective after several weeks owing to the formation of anti-hormones Because we now have calciferol in pure form, by [illegible] restrictions are [illegible] he phosphorus [illegible] The intake of calcium should be increased by giving calcium lactate or gluconate in doses of 6–12 grammes or more a day according to the severity of the condition

Calciferol

Calciferol is highly effective in the treatment of chronic hypoparathyroidism The dose required for a case of mild severity is 100,000 i u a day, but in severer cases [illegible]

Pre-operative and Post-operative Treatment of Adrenal Tumours

The removal of an adrenal tumour, especially in hypertensive patients, is not without its risks, the *operative mortality being high* *Death occurs usually within* 48 hours of the operation and is due to acute adrenal insufficiency This is because the adrenal gland on the opposite side is atrophic or even absent in these patients It is wise, therefore, to *determine the state of the contralateral gland before removal* of the tumour The complication does not arise after removal of a hyperplastic gland or when a malignant tumour cannot be completely eradicated

To *reduce the danger of such a disaster, the patient should be treated pre-*operatively and post-operatively with adrenal cortical extract and deoxycortone acetate Throughout the day before operation 10 grammes of sodium chloride *should be given by mouth, in the evening 10 milligrams of deoxycortone acetate* and 10 millilitres of cortical extract intramuscularly and before operation a further

are described in the section on Addison's disease

Pituitary Irradiation

of the adrenals ovaries or
us may be strikingly suc

Achard, C, and Thiers J (1921) *Bull Acad Méd Paris* 86, 51
Bishop, P M F and Close, H G (1932) *Guy's Hosp Rep*, 82, 143
Cushing H (1932) *Bull Johns Hopk Hosp*, 50, 137

HYPERPITUITARISM

ACROMEGALY

Historical Note

The clinical features of acromegaly were originally described and the *syndrome* named by Pierre Marie in 1886 In 1887 Minkowski connected the disease with a disorder of the pituitary gland In 1892 Massalongo suggested that hyperpituitarism was the cause, although he implicated the thymus as well *In 1900* Benda demonstrated that the pituitary tumours associated with the disease were composed of chromophil cells and in 1905 Dean Lewis definitely connected acromegaly with hyperpituitarism In 1921 this was proved experimentally by Evans and Long who produced acromegaly in rats with injections of anterior lobe extract

Basophilism) in which he concluded that cases of this type were due primarily to a basophil adenoma of the anterior pituitary gland The name of Cushing s syndrome was given to this condition by B shop and Close in 1932

DIAGNOSIS

The d sorder is characterised by a

he bones of
ntly than
ife in un
treated cases is about 5 years

There has been criticism of Cushing s hypothes s because the syndrome is often assoc ated with a tumour of the adrenal cortex removal of which greatly improves the condit on On account of this it has been suggested that pituitary basophilia may be a secondary phenomenon The syndrome may also occur in patients with a

result of these observations it has even been suggested that when the disorder appears to be of pituitary origin it should be termed Cushing s disease the term Cushing s syndrome being reserved for those cases with an apparently different aetiology

TREATMENT

Every case of Cushing s syndrome should be fully investigated to determine the presence of a pituitary adrenal thymic or ovarian tumour Sometimes to establish the diagnosis of an adrenal or ovarian tumour a laparotomy may have to be per formed Basophil adenomas are usually small and produce no change in the sella turc ca

If an ovarian or an adrenal tumour is the cause it should be removed surg cally

course of radiotherapy after the operation Instead of an adrenal tumour the adrenals may be found to be hyperplastic In these cases some observers advocate removing the larger gland and claim fairly satisfactory results In the writer s ex

Excessive irradiation hastens the onset of hypopituitarism, with its weakness and muscular atrophy.

Surgical treatment

optic chiasma and when increasing intracranial pressure is endangering life Surgical treatment may be effectively followed by a course of radiotherapy

Treatment of headache and complications

often the patient has extreme hunger which will not permit restriction of diet.

in which the gland embarrasses respiration Thyrotoxicosis is occasionally evident, but the results of subtotal thyroidectomy are frequently disappointing

GIGANTISM

Historical Note

In 1895 Brissaud and Meige concluded that gigantism was due to the same cause during the period of growth as acromegaly and in the same year Woods Hutchinson *suggested that it is due to hyperpituitarism* This was subsequently proved in animals by Evans and Long in 1921, when they produced gigantism with injections of anterior pituitary extract

Diagnosis

Gigantism is due to excessive secretion of growth hormone before the epiphyses have united, brought about by an eosinophil tumour or possibly by hyperplasia of the eosinophil cells of the anterior pituitary gland The excessive height is due mainly to the considerable increase in length of the lower limbs The disorder usually continues after the epiphyses have united, so that acromegalic changes become superimposed The endocrine features, complications and course of the disease are the same as in acromegaly

DIAGNOSIS

[illegible]

and the bones of the face hypertrophy of the skin subcutaneous tissues and muscles and splanchnomegaly There may be sexual disturbances diminished carbo hydrate tolerance and a raised basal metabolic rate In addition to these endocrine features extension of the tumour may cause visual defects by pressing on the optic chiasma Headache is a persistent and troublesome symptom The disease is insidious in its onset runs a chronic course and varies in its activity being characterized by spontaneous remissions and exacerbations

In the later stages of acromegaly there arise symptoms of hypop tuitarism mus cular weakness and apathy Death results from heart failure coronary thrombosis cerebral haemorrhage intercurrent infections or extension of the tumour into the brain substance

TREATMENT

General considerations

It is during the periods of hyperactivity that treatment is usually indicated but because of the insidiousness of the disease it may be difficult to assess the degree of

(1948) have found that in active acromegaly the serum inorganic phosphate

either by radiotherapy or by surgical measures but neither method of treatment will influence the bony changes which are irreversible Headache and complica tions should be alleviated as far as possible

Radiotherapy

[illegible]

sent may return the coarse greasy appearance of the skin improves and hyper trophy of the soft tissues diminishes (Vaughan 1939) The basal metabolic rate may fall and in some patients the carbohydrate tolerance rises The treatment is some times followed by a period of lethargy malaise and susceptib l ty to infections The headache is usually intractable and is rarely relieved by radiotherapy It is advisable to give a second course after the lapse of 2 or 3 months If there is no improvement after the first and especially after the second course the tumour may be considered to be radio resistant

hormone (L.H.) of the anterior pituitary gland The action of luteinizing hormone in laboratory animals is mainly luteinizing, that is, it transforms mature ovarian follicles into corpora lutea It also plays a part in ovulation, for in the hypo-

gonadotrophin has been shown to have little effect, if any, on the human ovary, but Brown and Bradbury (1947) conclude that it maintains rather than initiates the activity of the corpus luteum In the male it stimulates the interstitial tissue of the testes and thus brings about the secretion of testosterone Luteinizing hormone produced by the female pituitary gland is *the same substance as that produced by* the male, in whom it is known as the interstitial-cell stimulating hormone (I C S H)

Serum gonadotrophin

Injection of Serum Gonadotrophin (*B P*) is an extract of the serum of pregnant mares It is rich in follicle-stimulating hormone, which is the same substance

occur unless luteinizing hormone is subsequently given (Leonard and Smith 1933, Rowlands and Williams 1943) Reports of the effect of serum gonadotrophin on the human ovary are variable, but used in conjunction with chorionic gonadotrophin ovulation and corpus luteum formation have been produced (Rydberg and Pedersen-Bjergaard, 1943) In the male, follicle-stimulating hormone stimulates the seminiferous epithelium of the testes to produce spermatozoa, but therapeutically it is not completely effective because of the formation of antibodies (Smith 1942)

Pituitary gonadotrophic extracts

These contain both follicle-stimulating and luteinizing hormones Their effect on the human ovary is variable and unreliable

Combination of chorionic gonadotrophin and pituitary gonadotrophic extract

Th s extract (Synapo d n) consists of human pregnancy urine extract, containing

HYPOPITUITARY HYPOGONADISM

Males

In the main, the clinical features of this condition are similar to those of eunuchoidism *The logical method of treatment is with the gonadotrophins* but in practice the results are not satisfactory Although chorionic gonadotrophin stimulates the interstitial tissue of the testes and causes an increased secretion of testosterone, little effect is produced on the secondary sexual characteristics A possible reason for this is that the atrophic testes are unable to respond fully to the stimulus and to

TREATMENT

If the patient is first seen during the period of excessive growth or later in the disease when acromegalic changes are occurring, the treatment is the same as for acromegaly If, on the other hand, the epiphyses have united and the condition appears to be quiescent, there is no reason for treatment

Benda, C (1900) *Berl klin Wschr* 37, 1205
[illegible]

Kinsell, L W, Michaels, G D Li C H, and Larsen W E (1948) *J clin Endocrinol*, 8 1013
[illegible]

HYPOPITUITARISM

INTRODUCTION

Hypopituitarism is due to deficient secretion of the anterior pituitary gland This may be caused by any lesion of the anterior lobe such as a chromophobe tumour, craniopharyngioma, syphilis, tuberculosis and necrosis due to thrombosis It may also be caused by failure of development and idiopathic atrophy of the lobe There are various clinical types, namely, dwarfism due to deficiency of growth hormone, infantilism due to deficiency of growth hormone and gonadotrophic hormones on which normal sexual development depends, secondary hypogonadism in the adult, characterized by sterility, impotence and regression of secondary sexual characteristics in men and amenorrhoea and sterility in women, and finally Simmonds' disease

TREATMENT

If a tumour is the cause of hypopituitarism, it will require the appropriate treatment, as described in the section on pituitary tumours The treatment of dwarfism, infantilism and Simmonds' disease is described in sections dealing with those conditions

GONADOTROPHINS

[illegible]

cially are as follows

Chorionic gonadotrophin

Injection of Chorionic Gonadotrophin (*B P*) is an extract of the urine of pregnant women The hormone is derived from the placenta and is similar to the luteinizing

not produce secretion, but by destroying the pituitary gland in a greater or lesser degree cause various manifestations of hypopituitarism The chromophil tumours cause acromegaly and their treatment is discussed under that heading

CHROMOPHOBE ADENOMAS

Diagnosis

Chromophobe adenomas are commoner in adults than in children The most serious symptom is disturbance of vision Headache is not so troublesome as in acromegaly; it is probably due to stretching of the capsule of the gland Hypopituitarism shows itself in women by amenorrhoea, which is an early symptom but in men pituitary insufficiency is less readily observed Another early feature is rapid increase in weight, the cause of which is uncertain, it may be due either to hypo thalamic damage or to pituitary insufficiency Diabetes insipidus is not a usual finding

Treatment

Treatment consists either in irradiation of the tumour or in its surgical removal. There is, however, a lack of unanimity concerning the respective merits of these two methods [illegible]

early removal of the tumour and the use of radiotherapy for the large growths which render operation dangerous (Jefferson, 1939) In addition to treatment of the tumour itself, therapy may be necessary for the adiposity and for any sexual disturbances that may exist as a result of hypopituitarism

Radiotherapy

Chromophobe adenomas are rather less sensitive to radiotherapy than the chromophil tumours, but improving technique is increasing the chance of success Cystic tumours are unaffected and solid tumours vary in their response The results are poor in patients with optic atrophy, with large tumours and with the rare malig [illegible]

(Orley, 1939) The question to be decided is whether the early case without any visual defect should be treated surgically or by radiotherapy In favour of radiotherapy is that treatment is sometimes effective and has no operative risk On the other hand, Jefferson (1940), whose operative mortality for 98 cases of small adenomas was only 2 per cent, maintains that delaying operation in an early and favourable case while radiotherapy is tried increases the dangers of operation if this should prove to be necessary This low mortality is not true for all clinics and it is on the operative mortality rate in these early cases that the choice of radiotherapy depends

When irradiation is employed the visual fields should be mapped out every 3 or 4 weeks, any permanent deterioration of vision calls for immediate operation Sometimes a transitory visual defect lasting for a few days occurs as a result of

secrete a sufficiency of testosterone to have any effect It is therefore customary treat these patients in the same manner as those with eunuchoidism (page 647), th is, with derivatives of testosterone If desired, a trial may be made with chorion gonadotrophin, the dose being 1,000–1,500 units intramuscularly twice a week, b if there is little response after 3 months, testosterone should be used

These patients are also sterile as a result of atrophy of the seminiferous tubule

Further development of the secondary sexual characteristics may be brought abo by injections of testosterone propionate, 10-25 milligrams intramuscularly, twi a week Unless there is spontaneous improvement in the patient's condition, th treatment will have to be continued indefinitely Hence maintenance therapy in th form of subcutaneous pellets of testosterone propionate, the injection of crystals testosterone propionate or the sublingual administration of methyltestosterone w be more convenient to employ The details of these methods are described in th section on the male sex hormone

Females

The outstanding symptoms of hypopituitary hypogonadism in women a amenorrhoea and sterility These subjects are discussed under their appropria headings (pages 629, and 643)

Treatment of Anaemia

well

PITUITARY TUMOURS

INTRODUCTION

Much of our knowledge of the clinical features and surgical treatment c pituitary tumours we owe to the work of Harvey Cushing, who published a classic monograph on the subject in 1912 Tumours of the pituitary gland consist of (

cause visual defects The chromophobe tumours and the craniopharyngiomas d

TREATMENT

These tumours are practically always *radio resistant* Hence treatment is primarily surgical, but because of its close proximity to vital centres in the brain, the tumour cannot be removed entirely without endangering life Recurrences are therefore common and cysts may have to be aspirated many times A course of radio therapy after operation may be given in the hope that it will reduce the liability to recurrence A common post operative complication is hyperthermia, which is treated by cold sponging

For the treatment of diabetes insipidus, Fröhlich's syndrome and hypopituitarism, see the appropriate sections

[illegible]

ner J

SIMMONDS' DISEASE

HISTORICAL NOTE

Simmonds' disease is named after Morris Simmonds of Hamburg who in 1914 described many of the clinical features and associated them with destruction of the [illegible] gland He considered the syndrome to be the result of [illegible] y other [illegible] or lobe, [illegible] demon strated that incomplete forms of the disease are not uncommon and that most cases are due to a postpartum necrosis caused by a thrombosis, which is usually the result of a severe haemorrhage at delivery

DIAGNOSIS

As a result of pituitary insufficiency there is *deficiency of the thyroid* gland, adrenals and gonads, giving rise to symptoms referable to these disturbances The [illegible] extreme weakness, amenor [illegible] *isness and pre-* [illegible] ss of teeth and [illegible] sure and basal [illegible] *the emaciation* [illegible] ia nervosa in which emaciation, amenorrhoea and hypotension occur, is frequently confused with Simmonds' disease The complete picture of Simmonds disease is rare, *but in-*complete forms, in which wasting is not a feature, are not uncommon

TREATMENT

As a prophylactic measure all steps should be taken at parturition to prevent *severe haemorrhage and collapse* The occurrence of such an episode in the past

irradiation, but is of no serious significance, since improvement subsequently takes place After an interval of a few months a second and, if necessary, a third course is given In those cases that respond improvement is prompt and headache relieved, but sometimes improvement may not occur for several weeks If there is no evidence of improvement after 3 months, the tumour may be considered to be radio resistant and should be removed surgically Amenorrhoea usually persists, but sometimes normal menstruation is established

[illegible]

leagues 1938), a suitable dose being 5 millilitres two or three times a week Rarely, cystic degeneration or oedematous swelling of the tumour may occur as a result of irradiation and may necessitate immediate operation to preserve vision

Surgical removal

Surgical removal of the tumour is indicated in patients in whom vision is affected, in those in whom the tumour is radio resistant and in early cases when the operative risk is low In the case of large tumours surgeons do not care to operate because of [illegible]

some months (Cairns 1936) Since the tumour may not be completely removed a course of radiotherapy should be given after the patient has recovered from the operation with the object of reducing the risk of a recurrence (Henderson 1939)

Symptomatic treatment

Headache, unlike that of acromegaly, is usually relieved by radiotherapy or operation Adiposity requires treatment with a reducing diet on the lines recom mended on page 594, in some patients weight is lost as a result of treatment of the [illegible]

ment of which is described under those headings Whether or not menstruation [illegible]

CRANIOPHARYNGIOMAS

INTRODUCTION

Craniopharyngiomas, also known as Rathke pouch tumours or suprasellar cysts are commoner in children and young adults than in older subjects They are solid or cystic tumours almost always lying above the pituitary gland and rarely below it a Rathke pouch cyst is found very occasionally within the substance of the gland By pressing on neighbouring structures they cause visual disturbances oculomotor paralyses hypothalamic syndromes—for example, diabetes insipidus, Frohlich's syndrome and somnolence—various degrees of pituitary insufficiency including infantilism and symptoms of increased intracranial pressure such as headache, vomiting and papilloedema

Its action continues for about 4 months Alternatively, testosterone propionate (Injectio Testosteroni Propionate, *B P*), 25 milligrams, may be injected intramuscularly twice a week or methyltestosterone, 30 milligrams a day, given sublingually Side-effects of testosterone therapy in women are increased growth of hair on the face, acne and deepening of the voice, but they may not occur with the doses recommended

These measures
and energy, and in
Anaemia, if presen
mented with iron or liver extract according to the type of anaemia

Pregnancy

In cases due to a postpartum necrosis, Sheehan and Murdoch (1938) state that

sterone should not be administered, since it depresses ovarian function Sheehan and Murdoch suggest that the improvement resulting from pregnancy may be brought about by that part of the pituitary gland which is undamaged undergoing the normal hypertrophy which occurs during pregnancy

Crises

Crises may occur in Simmonds' disease similar to those in Addison's disease and may be related to the hypoglycaemia Their treatment is the same as that of an Addisonian crisis, but their response to therapy is not so good

A. W. SPENCE

Sheehan, H L (1937) *J Path Bact*, 45, 189

Press

PITUITARY SYNDROMES

DIABETES INSIPIDUS

HISTORICAL NOTE

Diabetes insipidus was distinguished from diabetes mellitus by Frank in 1794 In 1913 Farini and von den Velden demonstrated the antidiuretic effect of posterior pituitary extract In 1928 Kamm and his colleagues isolated pitressin from the posterior lobe of the pituitary gland The Hand-Schüller-Christian syndrome, of which diabetes insipidus is a feature together with exophthalmos and bony defects, was originally recorded by Hand in 1893 In 1928 Rowland showed that this condition is due to xanthomatosis.

DESCRIPTION

Diabetes insipidus consists of thirst, together with the passage of large quantities of urine of low specific gravity. It is caused by any lesion destroying the posterior

disappear in 48 hours as the action of the hormone wanes Recovery may be acceler ated with a mercurial diuretic

PSYCHOGENIC POLYDIPSIA AND POLYURIA

Although this is not an endocrine disorder, reference is made to it here because it may closely resemble true diabetes insipidus This is typified by the following case

Tannate in oil, which controlled to some extent, but not completely, the polyuria and thirst In addition to her bouts of hypersomnia, there were periods when she suffered from anorexia and abdominal pain, during which episodes she felt very ill and was con

extent at intervals of a few days, but she was advised to ignore this, since it was o serious significance At the end of the holidays she returned to her work as a school teacher, feeling well in every respect

Farini, A (1913) *Gazz Osp Clin*, 34, 879

Fisher, C, Ingram, W R, and Ranson, S W (1938) *Diabetes Insipidus* Michigan, Edward Bros

Frank, J P (1794) Quoted by Rolleston, H D (1936)

Hand, A (1893) *Arch Pediat*, 10, 673

Kamm, O, Aldrich, T B, Grote, I W, Rowe, L W, and Bugbee, E P (1928) *J Amer chem Soc*, 1, 573

Rolleston, H D (1936) *The Endocrine Organs in Health and Disease* London, Oxford University Press

Rowland, R S (1928) *Arch int Med*, 43, 611

von den Velden, R (1913) *Berl klin Wschr*, 40, 2083

FROHLICH'S SYNDROME (DYSTROPHIA ADIPOSO GENITALIS)

HISTORICAL NOTE

The syndror ... first described in 1900 by Babinski, th ... r In 1901, Fröhlich, of ... l other cases

lobe of the pituitary gland or causing bilateral destruction of the supra optic nuclei in the hypothalamus or destruction of the hypothalamico-hypophyseal tracts (Fisher, Ingram and Ranson, 1938) Such lesions include tumours chronic inflammatory conditions, xanthomatous deposits and trauma in this region The differential diagnosis from hysterical polydipsia is sometimes difficult

TREATMENT

Treatment should, if possible, be aimed at the fundamental lesion for example,

respond to radiotherapy Often treatment of the underlying lesion is not possible Hand Schuller Christian disease sometimes responds to radiotherapy

SYMPTOMATIC

The fluid intake of these patients should on no account be reduced below their requirements, but some limitation of the intake of salt may be beneficial

Pituitrin and Pitressin

Polyuria and thirst are immediately reduced by the administration of the posterior pituitary antidiuretic principle, which may be given as pituitrin (Injectio Pituitarii Posterioris, *B P*), an extract of posterior lobe, or as Pitressin (Injectio Vasopressini *B P*), the pressor principle (*beta* hypophamine) of the posterior lobe Injectio Pituitarii Posterioris (*B P*) is standardized to contain 10 oxytocic units per millilitre Pituitrin contains 10 pressor units per millilitre Injectio Vasopressini (*B P*) contains 10 pressor units per millilitre, whereas Pitressin contains 20 pressor units per millilitre These preparations are given intramuscularly in doses of

Intranasal administration—Sometimes the injection of these preparations causes

the septum and inferior turbinate Alternatively, the solution may be sprayed into the nose with an intranasal spray several times a day Another method is the intranasal insufflation of 25–50 milligrams of posterior pituitary powder 3 times a day Intranasal administration does not usually cause nasal irritation It is not quite so efficacious as intramuscular injection

Pitressin Tannate—An advance in therapy is the intramuscular injection of Pitressin Tannate in oily solution This is slowly absorbed from the site of injection and exerts its effect for 24–48 hours, thus reducing the number of injections It is given in doses of 1 millilitre (5 pressor units) every second or third day It is less likely to cause the side effects produced by the aqueous solution of Pitressin, but occasionally does not control the polyuria so well

Overdosage with Pitressin—Overdosage with Pitressin may cause headaches, abdominal cramps, diarrhoea, oedema and convulsions These symptoms usually

Adiposity may require the appropriate measures and polydactyly and syndactyly may be treated surgically

Bardet, G (1920) *Thèse de Paris*, No 470
[illegible]

SEX GLANDS DISEASES—FEMALE

ABORTION—HABITUAL

AETIOLOGY

Habitual abortion may be due to obvious organic causes, such as syphilis, general diseases or intercurrent infections, which are not within the scope of this section Apart from these, there remains a group of cases in which abortion occurs between the second and third month of gestation In a number of these cases there is evidence of progesterone deficiency, which is shown by decreased urinary excretion of pregnanediol, a degradation product of progesterone Progesterone is produced not only by the corpus luteum, but also by the placenta It is considered that abortion occurs if the amount of progesterone secreted by the corpus luteum is insufficient before it is produced by the placenta or if there is a delay in placental secretion On the other hand, abortion may take place in the absence of organic disease and in the presence of a normal excretion of pregnanediol These cases may be due to a "genetic factor" or to an abnormality of the foetus

TREATMENT

[illegible] abortion in which there is [illegible]

sublingually Other methods are the subcutaneous implantation of one pellet of progesterone (100 milligrams) every 2 months, or the intramuscular injection of 50 milligrams of progesterone crystals in aqueous suspension every 3 or 4 weeks

Some observers recommend the combined use of progesterone and oestrogen on the grounds that a synergism between the two exists (Vaux and Rakoff, 1945) This method consists of the injection of 10 milligrams of progesterone and 5 milligrams of oestradiol benzoate or dipropionate twice a week from the beginning to the end of pregnancy If depot therapy is employed, 20 milligrams of oestradiol should be implanted at the same time as the first pellet of progesterone

As an additional measure, 100 milligrams of *alpha* tocopherol (vitamin E) may be given daily by mouth or by intramuscular injection This amount is increased to 200 milligrams daily during each week that menstruation would have occurred

During pregnancy the patient should lead a quiet life and should avoid undue strain and exertion

Vaux, N W, and Rakoff, A E (1945) *Surg Clin N Amer*, 25, 1324

from the literature The syndrome was subsequently termed Fröhlich's syndrome and by the French Babinski's syndrome In 1906 Bartels called it dystrophia adiposo-genitalis

DESCRIPTION

Fröhlich's syndrome occurs in either sex and is characterized by adiposity, genital hypoplasia and (in males) a feminine configuration of the body, sometimes associated with dwarfism and diabetes insipidus It is caused by lesions of the hypothalamus or of its connexions with the pituitary gland, such as tumours in that region, chronic inflammatory conditions and trauma The syndrome is rare and is often confused with the syndrome of adiposity, delayed sexual development and femininity, which is common in boys at puberty and which is not due to a gross pathological lesion Patients with this condition, to which Simpson (1948) has given the name "adipose gynandrism", subsequently develop full maturity, although they retain their feminine characteristics Fröhlich's syndrome is also confused with obesity in children of either sex

TREATMENT

If a craniopharyngioma or, less frequently, a chromophobe adenoma is the cause of Fröhlich's syndrome, this should be treated surgically, if this is possible Adiposity is treated on the lines described in that section (*see* page 592) Genital hypoplasia in males may be improved by the administration of chorionic gonado-trophin and subsequently derivatives of testosterone, as described under the heading of hypopituitary hypogonadism (*see* page 618) Treatment with these hormones may result in increase of statural growth The treatment of failure of menstruation i described in the section on amenorrhoea (*see* page 629) Diabetes insipidus, whe present, is treated by the appropriate measures

Babinski M J (1900) *Rev neurol*, 8, 531
Bartels, M (1906) *Z Augenheilk*, 16, 407
Fröhlich, A (1901) *Wien klin Rdsch*, 15, 883, 906
Simpson S L (1948) *Major Endocrine Disorders* London, Oxford University Press

LAURENCE-MOON-BIEDL SYNDROME

A syndrome of dwarfism, adiposity, hypogonadism, mental deficiency and re pigmentosa was described by Laurence and Moon in 1866 Von Jaksch reported a similar case with polydactyly In 1920 the condition was re-descri Bardet and in 1922 by Biedl The congenital abnormalities that are fou numerous The syndrome is congenital and its occurrence may be spor familial It is unlikely that the primary cause is endocrine, the lesion res for the endocrine features probably being in the hypothalamus and infund The syndrome has been well reviewed by Sorsby, Avery and Cockayne (19

TREATMENT

Most of the patients are mentally defective and in these treatment of gonadism is hardly necessary In those with no mental defect the conditi treated as described under the heading of hypopituitary hypogonadism (see

and even change of occupation It is probable that the hypothalamus is influenced by the higher centres

TREATMENT

PRIMARY AMENORRHOEA

Since the administration of hormones is merely a replacement therapy, the endocrine treatment of amenorrhoea is, on the whole, disappointing Theoretically gonadotrophins are indicated when amenorrhoea is due to pituitary failure, but they are unsatisfactory Gonadotrophin therapy is still in the experimental stage When hormone therapy is necessary, it is the ovarian hormones or their synthetic equivalents that are used, and by their means the menstrual cycle may be closely imitated In primary amenorrhoea, however, they do not establish a spontaneous *menstrual rhythm nor necessarily do they make the patient fertile Often they fail* in primary amenorrhoea, especially when the uterus is infantile or refractory

2 weeks A less ex
milligram, 3 times
weeks This may
alternate days for
period Bleeding may occur about 2 days after the last dose of progesterone Treat ment with progesterone is not absolutely necessary, since if it is omitted a 'with drawal bleeding' usually takes place some days after the last dose of oestrogen

An alternative method is Zondek's 'rapid method' (Zondek, 1942) Proges

induce bleeding it was unnecessary to cause p

initially priming with oestrogen

With either method bleeding will not occur if the uterus is infantile or hypoplastic
should be stimulated
ilboestrol, 1 milli
iated It may be a
us is refractory to
stimulation, treatment will be unavailing

Delayed puberty

manifestation of delayed puberty, treatment is
on may start spontane
treatment for too long
however, may result in uterine hypoplasia which may be difficult to correct Treat ment by one of the above methods may establish normal menstrual rhythm Some cases respond well to thyroid in doses of 1–2 grains a day

amenorrhoea is associated with normal breast development and

to respond to treatment

ABORTION—THREATENED

In threatened abortion the patient should be confined to bed Treatment is with progesterone, but, as in habitual abortion, it is indicated only in those cases in which there is evidence of progesterone deficiency (Bender, 1948) It is injected intramuscularly in daily doses of 10 milligrams until bleeding ceases Thereafter treatment is continued as for habitual abortion The chances of success are much less than in habitual abortion, since bleeding has already occurred

Bender, S (1948) *Brit med J*, **1**, 683

AMENORRHOEA

TERMINOLOGY

Amenorrhoea is described as "primary" when the patient has never menstruated and as "secondary" when menstruation has previously been established

AETIOLOGY

PRIMARY AMENORRHOEA

Primary amenorrhoea may be due to disturbance of the function of the ovaries, pituitary gland or hypothalamus or to refractoriness of the uterus to stimulation by the ovarian hormones Menstruation occurs as a result of the cyclical action on the endometrium of the ovarian hormones, oestradiol and progesterone, deficient secretion of these causes amenorrhoea On the other hand, their secretion may be normal, but the uterus may have an inherent inability to respond When primary amenorrhoea is due to an ovarian cause, it is usually a developmental defect (ovarian agenesis) or failure of the ovary to reach maturity

The normal secretion of the ovarian hormones is dependent on an adequate secretion of gonadotrophins by the anterior pituitary Hence any condition which causes hypopituitarism (*see* page 617) may result in amenorrhoea The usual causes of primary amenorrhoea at the pituitary level are craniopharyngiomas, pituitary tumours and deficient secretion of gonadotrophins due to a congenital pituitary defect

There is reason to [illegible]
regulate p [illegible]
encephalit [illegible]
gonadotrophins

Delayed puberty, that is, a delay in the onset of menstruation, may be due to temporary uterine refractoriness, temporary ovarian refractoriness or to a delay in the full production of gonadotrophins

In addition, primary amenorrhoea may be caused by other endocrine conditions, such as hypothyroidism, diabetes mellitus, and adrenal cortical tumours, or by severe organic disease of other systems (*see* Dwarfism and Infantilism, page 604)

SECONDARY AMENORRHOEA

Secondary amenorrhoea may be caused by psychological disturbances, by lesions

THE CLIMACTERIC

Most of the common symptoms of the climacteric can be relieved by the adminis tration of adequate amounts of oestrogen In addition to symptoms due to the rap d

present before the *menopause but kept under control The menopause may have* been the trigger which upset the previous adjustment In treatment therefore the psychological aspect should be taken into consideration and dealt with appro priately

TREATMENT

that is likely to relieve the symptoms promptly This shows the patient the value of the treatment and has a good psychological effect After a month the dose should be gradually reduced to the minimal effective dose (for example, ethinyl oestrad ol *0 01 milligram daily) A uterine withdrawal bleeding may occur during the period* of reduction but is of no consequence since the patient has been accustomed to haemorrhage every month for the previous

oestrogen is not entirely satisfactory the

dipropionate (Injectio Oestradiolis Diprop

doses of 5 milligrams a week This dose should subsequently be reduced to the minimal effective dose

A method of oestrogen therapy suitable for the menopause is the subcutaneous implantation of oestradiol A single pellet of 20 or 25 milligrams is sufficient to relieve symptoms for 6 or 9 months since the rate of absorption is slow Another *method is the intramuscular injection of 10 milligrams of crystals of oestradiol* monobenzoate in aqueous suspension every 4 weeks

Androgens have been reported to be effective in relieving climacteric symptoms Their use is unnecessary a better result is obtained with oestrogens without risk of masculinization and with much less cost

Ulcerative stomatitis atrophic vaginitis kraurosis vulvae and leucoplakia vulvae are menopausal conditions All except leucoplakia respond well to oestrogen therapy Vaginitis and kraurosis require relatively high doses of the order of 0 05–0 1 milligram of ethinyl oestradiol a day for 2 or 3 weeks

DYSMENORRHOEA, ESSENTIAL

AETIOLOGY

Essential dysmenorrhoea may be defined as low abdominal pain which occurs before or during menstruation and for which there is no ascertainable organic cause Its aetiology is unknown but may be varied *In some cases it may be of*

SECONDARY AMENORRHOEA

In many cases of secondary amenorrhoea that are due to psychologi bances, endocrine therapy is not indicated, in fact such patients do not res to such treatment This is not unexpected, since the primary disturbance endocrine origin In most of these cases treatment of the amenorrhoea a unnecessary, and, once the psychological upset is removed, normal menst becomes re-established

Oestrogen therapy is also not indicated when amenorrhoea is due to some u lying organic cause, such as anaemia, nutritional deficiencies, thyroid and ad disease or tuberculosis The menstrual periods may return spontaneously a general condition improves

In those patients in whom none of these factors is present, treatment with ovarian hormones may be instituted as described above, and after 2 or 3 cour normal rhythm may be established A simplified method is that of Zondek (194 who, in cases of secondary amenorrhoea, gives 12 5 milligrams of progesteron and 2 5 milligrams of oestradiol benzoate intramuscularly in one injection dail for 2 consecutive days If the amenorrhoea is of more than 2 years' duration he recommends 10 milligrams of progesterone daily for 5 days

Zondek, B (1942) *J Amer med Ass.*, **118**, 705

CARCINOMA OF THE BREAST

Testosterone propionate sometimes exerts a temporary beneficial influence in carcinoma of the breast Although by no means a cure, it may relieve the pain and prolong life for several months The first to treat mammary cancer by this method was Loeser (1938), who implanted 600 milligrams of testosterone propionate at intervals of 6 months each in a woman with recurrence after mastectomy and obtained favourable results The treatment should be reserved for inoperable cases and for those with metastases Doses as high as 200 milligrams intramuscularly daily or 5 times a week are being used This should be continued for 2 or 3 months, subsequent courses may be required Such high doses produce masculinization, which cannot be prevented

Oestrogens may similarly cause temporary regression in women over the age of 60 years They have the disadvantage that they may induce uterine bleeding, and for this reason they are best used in women who have undergone hysterectomy Oestrogens are contra indicated in young patients, because they may accelerate the progress of the disease They are given as stilboestrol, 5 milligrams 3 times a day, or ethinyl oestradiol, 0 15–0 7 milligram daily (Hermann, Adair and Woodard, 947) When improvement has been obtained, the dose may be gradually reduced a daily dose of 5 milligrams of stilboestrol or 0 1 milligram of ethinyl oestradiol e treatment should be continued for several months, and subsequent courses may necessary

mann, J B, Adair, F E, and Woodard, H Q (1947) *Arch Surg., Chicago*, **54**, 1
er, A A (1938) *Brit med J*, **2**, 320

Oestradiol tablets

Oestradiol tablets may be used for sublingual therapy, the hormone being absorbed by the buccal mucosa Oestradiol loses 90 per cent of its activity if swallowed The tablets are supplied in doses of 0 04 milligram, 0 1 milligram and 1 0 milligram

Ethinyl oestradiol

Ethinyl oestradiol is the most potent oral oestrogen, and is supplied in tablets of 0 01 milligram and 0 05 milligram It may be swallowed or administered sublingually

Oestradiol ointment

Oestradiol ointment is supplied in tubes containing 0 1 milligram of oestradiol and 2 milligrams of oestradiol benzoate per gramme of ointment

Suppositories

Suppositories are supplied containing 0 1 milligram and 1 milligram of oestrone

Crystals of oestradiol benzoate

This preparation is supplied in ampoules of 2 millilitres of an aqueous suspension of 10 milligrams of crystals of oestradiol benzoate with 2 milligrams of Nupercaine to produce local anaesthesia They are given by intramuscular injection and, being slowly absorbed, exert their effect for about 4 weeks (*see* page 650)

Oestradiol pellets for implantation

For implantation oestradiol pellets are supplied as tablets or cylinders of 20 milligrams of oestradiol (for the technique of implantation, *see* page 650) They may be used for conditions such as the climacteric, when cyclical therapy is not indicated, and they relieve symptoms for about 9 months

SYNTHETIC OESTROGENS

The synthetic oestrogens include stilboestrol, hexoestrol, dienoestrol and benzoestrol for oral administration

PREPARATIONS OF PROGESTERONE

The commercial preparations of progesterone are detailed below

PROGESTERONE

[illegible] action

[illegible] milli

[illegible] ease

its activity has not been produced

ETHISTERONE

Ethisterone (anhydrohydroxyprogesterone) is a derivative of progesterone that is active by mouth It is supplied in tablets of 5 milligrams, 10 milligrams and 25 [illegible]

psychogenic origin, in others a local neuritis has been suggested, so that pain is produced when the uterus contracts Increased uterine contractions have been cited

not occur in women who have not ovulated and in whom, therefore a corpus luteum has not developed Another aspect is that the pain may result from contrac tions of an ill developed uterus, but this view does not bear analysis, since amenorrhoea is a frequent accompaniment of this condition It has also been suggested that

compressed and pain is produced, Finally, dysmenorrhoea may be of ovarian origin (Browne 1939) Some of these hypotheses may be true and it is probable that the mechanism of the production of pain is not the same in all patients

TREATMENT

General Measures

Before the diagnosis of essential dysmenorrhoea is made, organic causes, such as fibroids and pelvic inflammation, should be excluded When essential dysmenorrhoea occurs in neurotic or highly strung subjects, instruction concerning the physiological processes of menstruation may be helpful Although there may not be any evidence of constitutional disease, the patient may be somewhat asthenic In these patients, measures should be taken to improve the general condition and to promote physical fitness Such measures include adequate diet, a sufficiency of vitamins adequate sleep and exercise Constipation is often present and may be an

occurs in many women who are perfectly healthy mentally and physically

Mild analgesics, such as tablets of acetylsalicylic acid, tablets of acetylsalicylic acid and phenacetin, or compound tablets of codeine, are usually indicated and are often efficacious

In severer cases, when the patient may be to some extent incapacitated, other measures may be tried in addition with varying success These are summarized below

Dilatation of the Cervical Canal

It has been observed that dysmenorrhoea occurs less frequently after childbirth An explanation put forward for this is that stretching the cervical canal may

cent of patients

mid-cyclical bleeding, occurring midway between the two menstrual periods, metrorrhagia, or irregular bleedings in an otherwise normal cycle, and metropathia haemorrhagica, in which severe, prolonged and irregular bleeding occurs with prolonged intervals of amenorrhoea

AETIOLOGY

Functional uterine bleeding occurs at puberty, during maturity and at the menopause It may be related to failure of ovulation, which results in imperfect formation of the corpus luteum and in deficiency of progesterone, or ovulation may occur, but the subsequent formation of luteal tissue is poor As a result, the endometrium is subjected to the prolonged action of oestrogen at a "threshold level", [illegible]

when ovulation and full maturity become established

The cause of mid-cyclical bleeding is obscure, but it is in some way related to ovulation It may be due to delay in the secretion of progesterone

Metropathia haemorrhagica is a separate entity It is ascribed to excessive secretion of oestrogen and to deficiency of corpus luteum, and is associated with cysts of the ovaries

TREATMENT

It is essential that before the diagnosis of functional uterine bleeding is made general causes of uterine bleeding, such as the haemorrhagic diathesis, hypothyroidism and congestive heart failure, should be excluded, and the patient should be seen by a [illegible] caused by carcinoma of the uterus, by [illegible] ng a patient as suffering from functional [illegible] iary investigations is to be deprecated

Hormone Therapy

The description which follows does not apply to mid-cyclical bleeding, which is discussed separately The hormones that have been used in the treatment of functional uterine bleeding are thyroid, chorionic gonadotrophin, serum gonadotrophin, prolactin and oestrogens, progesterone and derivatives of testosterone, either singly or in combination

Thyroid

Tablets of thyroid, 1 to 2 grains a day, are often effective in puberty bleeding

Gonadotrophins

Serum gonadc [illegible] ectio
Gonadotrophin [illegible] ially
in puberty bleedi [illegible] this
condition, usually with 10 or 12 daily intramuscular injections of 500 i u (Greene, 1948) The general consensus of opinion, however, is that it is unreliable and has

CRYSTALS OF PROGESTERONE

used in conditions, such as habitual abortion when a prolonged action is desired

PROGESTERONE PELLETS FOR IMPLANTATION

DOSE EQUIVALENTS

OESTROGENS

Estimations of the relative potency of oestrogens are at variance because of the different methods that have been employed the different rates of absorption and excretion of the compounds and the varying sensitivity of the test subjects The following figures therefore must be regarded as only approximate and are given merely as a guide

PROGESTERONE

One milligram of progesterone intramuscularly appears to be equivalent to about 6 milligrams of ethisterone sublingually

FUNCTIONAL UTERINE BLEEDING

DEFINITION AND CLASSIFICATION

the time of menstruation polymenorrhoea when the menstrual cycles are shortened so that bleeding occurs too frequently (it may be associated with hypermenorrhoea),

ceased The treatment was repeated during each pre-menstrual week to prevent relapses and the dose was gradually reduced, so that ultimately only 5-10 milli grams were required each month After 6 courses menstruation sometimes con

Testosterone

Derivatives of testosterone are often effective in all types of functional uterine bleeding Except in metropathia haemorrhagica, bleeding may be controlled with quite small doses, such as 10 milligrams of methyltestosterone a day sublingually throughout the cycle Disadvantages of testosterone therapy are that it rarely establishes normal menstrual rhythm and, since it may suppress ovulation, it should not be administered for a prolonged period Further, prolonged administration may cause masculinization, that is, enlargement of the clitoris, deepening of the voice, acne and increased growth of hair on the face and breasts, though perhaps not with the doses mentioned

Another method of employing testosterone is the daily intramuscular injection of 25 milligrams of testosterone propionate (Injectio Testosteroni Propionatis, *B P*) for 3 days This treatment may control bleeding in 24 hours and may be useful in

oges
onate
rone

follow, after which there may ensue the n
after progesterone alone should be given as described previously (Greenblatt and Kupperman, 1946)

OTHER MEASURES

Curettage, whatever its rationale, may sometimes be effective If metropathia haemorrhagica, maturity and menopausal bleeding are not controlled by hormone therapy and the patient is becoming incapacitated, a subtotal hysterectomy is advisable

TREATMENT OF MID CYCLICAL BLEEDING

If the mid-cyclical bleeding is slight, treatment may not be necessary The condition is sometimes benefited by curettage Progesterone, *5 milligrams daily for 4 days*
lingu

Bishop, P M F (1948) *Practitioner*, 161 211
Goldzieher, M A (1945) *J clin Endocrinol* 5 132
6 675
e & Spottiswoode

ol, 121 98

little or no effect on the human ovary The writer has obtained satisfactory results with Synapoidin, a combination of chorionic gonadotrophin and pituitary follicle-

appeared at the normal time Subsequent injections were started on the fifth day of the cycle and were later reduced to twice a week Gonadotrophin is useless in metropathia haemorrhagica and menopausal bleeding

Prolactin

bleeding ceased, but for at least 4 consecutive days, thereafter injections were given every other day for at least one additional week After 3 months, normal cycles were obtained in most patients It may act by inhibiting the secretion of oestrogen and by stimulating the corpus luteum

Oestrogens

Repeated courses will be necessary (Bishop, 1948)

Progesterone

and Kupperman, 1946)

by the normal period of amenorrhoea The treatment is repeated during the 2 days before each menstrual period

In metropathia haemorrhagica, Scowen (1944) used progesterone with success He gave 20 milligrams of progesterone intramuscularly on alternate days over a period of 8 days With this, bleeding was intensified, lasting for 4–7 days, and then

ceased The treatment was repeated during each pre menstrual week to prevent relapses and the dose was gradually reduced, so that ultimately only 5–10 milli grams were required each month After 6 courses menstruation sometimes con

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If haemorrhage is not satisfactorily controlled by the 5-day course of progesterone described above, the combination of 25 milligrams of testosterone propionate and 10 milligrams of progesterone daily for 3–5 days may be employed Testosterone will stop bleeding for 2 or 3 days, then progesterone withdrawal bleeding will

OTHER MEASURES

Curettage, whatever its rationale, may sometimes be effective If metropathia haemorrhagica, maturity and menopausal bleeding are not controlled by hormone therapy and the patient is becoming incapacitated, a subtotal hysterectomy is advisable

TREATMENT OF MID CYCLICAL BLEEDING

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Bishop P M F (1948) *Practitioner*, 161 211
Goldzieher M A (1945) *J clin Endocrinol* 5 132.

LACTATION

FAILURE OF LACTATION

lactogenic hormone of the anterior pituitary, has proved on isolation to be disappointing clinically and less effective in animals than crude extracts It appears probable, therefore, that anterior pituitary hormones other than prolactin are also concerned in the initiation of lactation (Folley and Young, 1941) Both oestrogens and thyroid have been shown to improve the milk output in animals, but they have not yet been sufficiently investigated in women.

Robinson (1947) has done valuable work on the promotion of lactation Her observation that large doses of thyroid greatly increased the milk yield in puerperal women led her to try the effect of Lugol's solution (5 per cent iodine in 10 per cent

creased by 300 per cent. She concludes that failure to establish a satisfactory milk output is due to deficiency of oestrogen and of iodine Oestrogens are needed to control the milk flow through the breast during the first 4 days of the puerperium, whereas iodine increases the output of milk from the fourth day onwards Oestrogen deficiency is indicated by lumpy breasts with a thick yellow secretion that is difficult to express, iodine deficiency by soft empty breasts with a scanty secretion of milk. If both deficiencies are present, oestrogen should be given, first as stil-

INHIBITION OF LACTATION

intramuscularly daily for 2–4 days Whichever preparation is used, the results are better the sooner after delivery treatment is started

PERSISTENT LACTATION

Lactation may sometimes persist for months or years after the normal period It is treated as described above Persistent lactation is rarely associated with atrophy of the uterus and ovaries, known as Chiari-Frommel disease, for which there is no satisfactory treatment.

Barnes, J (1942) *Brit med J*, 1, 601.

MASTOPATHIA (CHRONIC MASTITIS)

Local inunction of testosterone ointment in daily doses of 3–10 milligrams of ... patients with mastopathia (Spence, ... day depending on the severity ... uld be washed with soap and warm water to remove fatty material which may impede absorption With this method of androgen therapy there is no disturbance of menstrual function and no risk of masculinization Good results have been claimed with progesterone in doses of 5 milligrams intramuscularly twice a week during the last 2 weeks of the menstrual cycle

Frequently mammary pain is of psychogenic origin and may be difficult to alleviate Patients should be reassured and are sometimes helped by injections of an inert substance or by inunction of a placebo ointment

Spence, A W (1940) *Lancet*, 2, 387.

OVARIAN INFANTILISM

CLINICAL DESCRIPTION

Ovarian infantilism is characterized by retention of the infantile type of genitalia, and by failure of development of the secondary sexual characteristics due to primary ... interpart of eunu ... use of stature, ... 's syndrome (Turner, 1938) or ovarian agenesis This condition may be associated with osteoporosis, hypertension and congenital defects, such as webbed neck, *spina bifida*, syndactylism, and ocular abnormalities That it is not of pituitary origin is shown by the high ... and Koch 1942, Albright,

LACTATION

FAILURE OF LACTATION

lactogenic hormone of the anterior pituitary has proved on isolation to be dis appointing clinically and less effective in animals than crude extracts It appears probable therefore that anterior pituitary hormones other than prolactin are also concerned in the initiation of lactation (Folley and Young 1941) Both oestrogens and thyroid have been shown to improve the milk output in animals but they have not yet been sufficiently investigated in women

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repeated Robinson s work and has been unable to confirm her results

INHIBITION OF LACTATION

it is the experience of most observers that larger doses are necessary With stil boestrol 5 milligrams are given twice a day for 2 days the dose then be ng reduced by 1 milligram each day until 1 milligram is being given twice a day and the treat ment terminated usually at the end of 7 days With ethinyl oestradiol 0 1 milli

of ovulation Biopsies should be carried out during several cycles, since normal women occasionally have an anovular cycle

followed through 2 or 3 cycles It thus gives information on whether ovulation has occurred and, *if so, the time of its occurrence (Martin, 1943, Tompkins, 1945)*

Patency of the Fallopian tubes is determined by insufflation of the tubes and by salpingography with Lipiodol Incompatibility of the cervical secretions and of spermatozoa is indicated by finding dead or inactive spermatozoa a few hours after coitus, when the semen is known previously to have been normal

TREATMENT

Gynaecological and general conditions which may be responsible for sterility should be treated by the appropriate measures If there is no evidence of any organic cause and if it appears that ovulation does occur, failure to conceive may be due to intercourse never having taken place at the time of ovulation, and advice should be given accordingly

theoretically this should be treated with

ing hormone, may be tried It should be given daily in doses of

intramuscularly for the 7 days after menstruation has ceased Rydberg and Pedersen-Bjergaard (1943) produced ovulation by giving 6 daily *intramuscular injections* of serum gonadotrophin in doses of 3,000 i u and then chorionic gonadotrophin,

1,000 i u of chorionic gonadotrophin (Injectio Gonadotrophini Chorionic intramuscularly for 7 days He warns that as such therapy is only in the experimental stage it should be left to those experienced in its use

infantilism or ovarian

il hypoplasia should

ms daily) during the

if there is any reason

given in doses of 10 milligrams every other day during the last 10 days menstrual cycle, or 300 milligrams of ethisterone throughout the same period

TREATMENT

treatment of amenorrhoea The sexual development and monthly uterine bleedings

Albright F Smith P H and Fraser R (1942) *Amer J med Sci*, 204 625
Turner H H (1938) *Endocrinology* 23 566
Varney, R F, Kenyon A T, and Koch F C (1942) *J clin Endocrinol*, 2, 137
Wilkins, L, and Fleischmann W (1944) *J clin Endocrinol*, 4 357

STERILITY

This section should be read in conjunction with the section on Sterility and Subfertility in the Male (*see* page 651)

AETIOLOGY

Sterility in the female may be due to failure of ovulation, which should be suspected in cases of amenorrhoea and excessive uterine bleeding It may therefore arise through any cause which decreases the output of pituitary gonadotrophin, on which ovulation normally depends (*see* Hypopituitarism page 617) or through intrinsic disease of the ovaries, for example, tumour, cysts and oophoritis The ovaries may also fail to mature (ovarian infantilism) or they may be unable to respond to gonadotrophic stimulation

On the other hand ovulation may occur, but the ova may be unable to pass down the Fallopian tubes, which may be blocked by chronic inflammatory processes or because of malposition of the uterus Through disease of the cervix, such as

which is reckoned to be between the eleventh and the seventeenth day Finally, the semen may be deficient in the enzyme hyaluronidase which enables the spermatozoa to penetrate the ovum

METHODS OF DIAGNOSIS

Failure of ovulation may be determined by endometrial biopsies and by a study of the basal temperature chart Biopsies are performed during the pre-menstrual week, when the endometrium normally shows the luteal phase, indicating that ovulation has occurred Absence of evidence of luteal activity may signify failure

administration of oestrogen for example stilboestrol or ethinyl oestradiol Stil
ns 3 times a day and ethinyl oestradiol in
a day In those patients who react well
disappear and metastases regress so that
patients previously bedridden may be able to lead fairly normal active lives On the other hand some patients do not respond at all When urinary retention is present the prostatic obstruction should be dealt with surgically before treatment with oestrogen

It is important to continue treatment indefinitely When the full therapeutic response has been obtained the dose may be reduced to a maintenance dose of 5 milligrams a day for stilboestrol and 0 05 to 0 1 milligram a day for ethinyl oestradiol This is particularly indicated if the larger dose is not well tolerated and side-effects are troublesome

The actual mode of action of oestrogen is uncertain but it may be said that it reduces in some way the supply of androgens

SIDE EFFECTS OF OESTROGEN THERAPY

The commonest of these side-effects are pigmentation of the areola of the breast

THE CLIMACTERIC

DESCRIPTION

It is not generally agreed that such an entity as the male climacteric exists In the writer s opinion it does occur but far less frequently than its counterpart in women Its comparative rarity is due to the much more gradual decline in gonadal function

to concentrate, emotional instability and fits of depression More se
volutional melancholia and suicidal tendencies may occur

TREATMENT

Treatment consists of the intramuscular injection of 10–25 milligrams of testosterone propionate 2 or 3 times a week This may be followed by the sublingual administration of methyltestosterone 10–20 milligrams daily or the subcutaneous implantation of 200 milligrams of testosterone propionate or the intramuscular injection of 50 milligrams of testosterone propionate crystals in aqueous suspens on every 4 weeks This restores potency improves the symptoms and gives a feel ng of well being

EUNUCHISM AND EUNUCHOIDISM

HISTORICAL NOTE

Castration was practised by ancient Eastern peoples on the guardians of the harems the word eunuch meaning guardian of the bed Castration was also

UNDER-DEVELOPMENT OF THE BREASTS

When under-development of the breasts is due to ovarian deficiency, which is shown by amenorrhoea, growth of the breasts occurs as a result of the administration of oestrogens These are given as described in the section on Amenorrhoea (page 629) *An additional measure is to massage the breasts with an ointment* containing oestradiol The amount to be rubbed into each breast is about 0 2 milligram of oestradiol twice a day Treatment should be continued indefinitely to avoid regression

Frequently under-development of the breasts is present in the absence of any evidence of ovarian deficiency This condition is due to failure of the breasts to respond to the normal hormonal stimulus, and in practice the results of oestrogenic therapy are disappointing Large doses of oestradiol have little or no effect and upset the menstrual cycle Local inunction of oestradiol ointment, 0 2 milligram of oestradiol twice a day, may be tried, together with 0 5 milligram of stilboestrol daily by mouth With these doses there is little or no disturbance of the menstrual rhythm

VIRILISM

CLINICAL DESCRIPTION

Virilism or masculinization means the development in the female of certain masculine characteristics, namely, the growth of hair of male distribution, deepen-

thymus gland, an adrenal cortical tumour or hyperplasia, an arrhenoblastoma of the ovary or an adrenal cortical tumour in the ovary It may also be present without any ascertainable cause It is usually associated with an increased urinary excretion of androgens and of 17 ketosteroids, which are degradation products of androgens Mild virilism may occur at the climacteric

TREATMENT

The treatment of virilism consists of treating the cause, which is described in the section on the Adreno-genital Syndrome (page 602) Adrenal and ovarian tumours can be removed with good effect

SEX GLANDS DISEASES—MALE

CARCINOMA OF THE PROSTATE

When carcinoma of the prostate, for whatever reason, is not treated surgically, some relief of symptoms and perhaps prolongation of life may be obtained by the

course of chorionic gonadotrophin (Injectio Gonadotrophini Chorionici, *B P*) in doses of 500–1,000 international units intramuscularly twice a week, in order to bring about growth of the testes and to stimulate the production of androgen If this treatment proves to be satisfactory, it should be continued until perchance the testes are able to function spontaneously, otherwise testosterone propionate should be given in doses of 10–25 milligrams intramuscularly, twice a week In addition to hastening sexual development chorionic gonadotrophin and testosterone propionate increase the growth rate of these children

COMPLICATIONS OF TESTOSTERONE THERAPY

Treatment with testosterone may cause acne vulgaris and hyperplasia of the breast tissue Symptoms of overdosage are priapism excessive genital growth and slight oedema due to sodium retention The maximum tolerated dose in adults is about 150 milligrams of testosterone propionate intramuscularly a week

Cawadias, A P (1946) *Proc R Soc Med*, 39, 501

GYNAECOMASTIA

AETIOLOGY

Gynaecomastia is unilateral or bilateral hyperplasia of breast tissues in the male It has been described most often in patients with testicular atrophy, but is rarely seen in eunuchs It occurs in association with testicular tumours, that is interstitial cell tumours, teratoma, chorionepithelioma and adenocarcinoma Rarely it is due to a tumour of the adrenal cortex and has been observed in pituitary and pineal [illegible] of the l[illegible] It may arise [illegible] s for [illegible] re is no apparent cause Physiological hypertrophy of the breast frequently occurs during or after puberty

TREATMENT

In the treatment of gynaecomastia neither the derivatives of testosterone nor progesterone are effective, the treatment of choice is surgical removal of the breasts Any underlying condition should be treated by the appropriate methods The mammary hyperplasia of puberty requires no treatment, since the condition subsides spontaneously Gynaecomastia that has arisen in men working with stilboestrol gradually subsides when they change their occupation

IMPOTENCE

AETIOLOGY

Impotence is caused by endocrine or by psychological factors or it may be the result of a lesion of the spinal cord Addiction to drugs and alcohol may also be responsible Psychological factors are by far the commonest causes, they are [illegible] of the wife in the home a [illegible] s worries complete [illegible] states In very few

performed on religious grounds by these peoples, by early Christians and, i
middle of the eighteenth century, by the Skoptzys, a Russian sect which spre
Rumania Our medical knowledge of eunuchism is based on the study
Skoptzys (Cawadias, 1946)

DESCRIPTION

Eunuchism is the condition produced by castration of the male and consist
sterility and the absence or decline of secondary sexual characteristics, depend
on whether the operation was performed before or after puberty Eunuchoidism i
similar condition caused by testicular atrophy due to failure of developmen
orchitis, degenerative changes and trauma The main complaints of these patien
are their feminine appearance and failure to grow a beard, impotence and mil
psychological disturbances, such as lack of concentration and lack of energy

TREATMENT

Adults

The treatment of eunuchism and eunuchoidism after puberty consists of substitution therapy with derivatives of testosterone The results are dramatic The patient rapidly acquires full potency and libido, increased muscular strength, a feeling of well being, increased energy and self confidence The voice becomes deeper and the penis and prostate increase in size, but although there is an increased growth of axillary and pubic hair, the hair on the face is slow to appear

Initially, testosterone propionate is given intramuscularly in doses of 50 milligrams 2 or 3 times a week Frequent and uncomfortable erections indicate overdosage, but the dose should be as high as possible in order to build up the secondary sexual characteristics rapidly After about 2 months, when the optimal dose has been determined, pellets of testosterone propionate are implanted subcutaneously in equivalent dosage, for example if the patient has been receiving 100 milligrams a week intramuscularly, five 100-milligram pellets should be implanted The life of a 100-milligram pellet is about 4 months, as judged by a decline in potency and muscular strength, when a further implantation should be made (for the technique of implantation *see page 650*)

An alternative method to implantation is the intramuscular injection of 100 milligrams of testosterone propionate crystals in aqueous suspension every 3 or 4 eeks, again the time for subsequent injections being judged by a decline in potency

If desired testosterone may be given sublingually in the form of tablets of methyl tosterone This method of treatment should not be adopted before the fullest elopment of the secondary sexual characteristics has been obtained with paren l and implantation therapy, because the dose required is four times that of the ted hormone Methyltestosterone is best reserved for maintenance, the dose ng from 10 to 20 milligrams a day

e Puberty

ocrine therapy in children in whom eunuchoidism is suspected should not ly be employed, since the diagnosis of genital hypoplasia in a child is open ion It is preferable to delay treatment until failure of development at the age shows that it is indicated Treatment is begun with a three months'

The specimen of semen should be either self-produced or collected after coitus interruptus It should be ejaculated into a clean, warm glass container (*not* into a condom, because most condoms immobilize spermatozoa in a few minutes) and should be examined within 3 hours *The points which are taken into account* are the volume of fluid, the number of spermatozoa per millilitre, their morphology, motility and viability (Harvey and Jackson, 1945) The minimal normal density of spermatozoa may be taken as 50 million per millilitre

Normal semen —If the semen is normal, careful inquiry should be made into the sexual life of the patient, times of intercourse and whether there are any difficulties in coitus Advice should be given on any matters that are pertinent The patient should be instructed to have intercourse *during the periods of ovulation* which usually occurs between the eleventh and seventeenth days of the menstrual cycle An indication of the time of ovulation is given by the basal temperature chart, which records a slight rise of temperature at the time of ovulation (*see* Female Sterility, page 643)

[illegible] f the po nts ment oned s that of a pat ent who was [illegible]

condom which would have accounted for the immotility He was instructed to collect the specimen in a glass to have intercourse mostly during the period of ovulation and to allow his orgasm to synchronize with that of his wife As a result of this change in technique, it was subsequently reported that all his spermatozoa were actively motile later his wife became pregnant and at term gave birth to a child

Patients with impotence and premature ejaculation usually complain primarily of these conditions They are due to psychological factors, for example to anxiety [illegible] tates Endocrine treatment of such [illegible] be expected since they [illegible] ould therefore be treated [illegible] be wholly satisfactory

Abnormal semen —When abnormalities of the seminal fluid are found, the patient should be examined to determine the existence of any aetiological factor Conditions such as chronic infections, anaemia, diabetes mellitus hypothyroidism hyper[illegible] *Treatment of these* [illegible] described below to stimulate, if possible, spermatogenesis [illegible] nis general examination is negative and the problem is whether spermatogenesis is at fault or whether [illegible] *The* [illegible] *conditions may be differentiated by* [illegible] paired

Testicular Biopsy

This is a valuable method of investigation which is carried out by puncturing the tunica albuginea with a tenotome knife and removing the small herniation which results By this means *the actual state of the seminiferous tubules* may be observed and a distinction made between impaired spermatogenesis and occlusion of the ducts (Charny, 1940, Walker, 1945)

patients sexual excess in the past may be the cause Psychological impotence is high amongst officers and men who have returned from service overseas, combatants [illegible] in some cases long continued celibacy may possibly be a reason [illegible]

TREATMENT

Endocrine impotence is treated with testosterone as described in the section on eunuchoidism, unless treatment of the causative condition, such as diabetes mellitus and myxoedema, results in improvement Psychological impotence is not benefited by male hormone therapy, in these cases there is no deficiency of male hormone and testosterone and its derivatives are not aphrodisiacs Treatment should aim at adjusting the patient's psychological disturbance

THE MALE SEX HORMONE

HISTORICAL NOTE

The existence of a factor in the testes responsible for male characteristics was first demonstrated by John Hunter (1786) The function of the testes in the development of the primary and secondary sexual characteristics was put on a sound footing by the findings of Goodale and of Pézard in 1911 In 1927 McGee, in F C. Koch's laboratory in Chicago, first prepared a highly active extract of male hormone from bulls' testes In 1931 Butenandt prepared from human male urine a crystalline androgen which he named androsterone In 1935 David and his collaborators obtained from testicular extract a more active crystalline substance, testosterone, which is considered to be the natural hormone of the interstitial tissue A few months later it was synthesized from cholesterol by Ruzicka and Wettstein (1935) and by Butenandt and Hanisch (1935) independently In 1936 Miescher, Wettstein and Tschopp showed that esters of testosterone, particularly the propionate, produce a more prolonged action than the pure hormone A solution of testosterone propionate in oil is therefore used for intramuscular therapy

PREPARATIONS OF TESTOSTERONE

The preparations of testosterone available for clinical use are as follows

Testosterone Propionate

Testosterone propionate (Injectio Testosteroni Propionas, *B P*) is dissolved in [illegible]

Methyltestosterone

Methyltestosterone (Methyltestosteronum, *B P*), is supplied in tablets of 5 milligrams, 10 milligrams, 25 milligrams and 50 milligrams for oral or sublingual

testes respond to hormone treatment An ectopic testis will not descend spontaneously and will not respond to hormone treatment In this type an orchidopexy is necessary If maldescent is due to an anatomical abnormality hormone therapy will also be unsuccessful but if it is doubtful whether such an abnormality is present it is

possible that in most of these cases spontaneous descent would occur but it is better to treat them rather than to wait for this to happen A testis which is impalpable may be situated in the abdomen or high up in the inguinal canal It is unlikely that an abdominal testis will respond to hormones, but an attempt to induce descent by this means should be tried because of the difficulties encountered in bringing an abdominal testis into the scrotum by surgical measures

*Hormone treatment consists of intramuscular injections of chorionic gonado*trophin twice a week, the usual dose being 500 international units An alternative method is the intramuscular injection of testosterone propionate 10-25 milligrams twice a week but this is not quite so effective as gonadotrophin Treatment should be given continuously without any rest periods A successful result may be obtained within 3, 6 or 9 months It is inadvisable to give hormone treatment to patients

berty and (2)

The best age

one treatment

ake place As

the testis descends an inguinal hernia may sometimes become apparent and should be subsequently dealt with surgically

SEX HORMONES—OTHER USES

ENURESIS

he treatment of

bladder and sphincter tone

BUCCAL LEUCOPLAKIA AND BUCCAL ULCERATION

Leucoplakia consists of thickened whitish patches on the mucous membrane of the cheeks gums and tongue The cause is uncertain but syphilis is sometimes an aetiological factor

Small flat painful ulcers with a yellowish base may occur in the same *positions* Soreness of the mouth and tongue may exist without the appearance of ulceration The general health is good dental sepsis and tonsillar sepsis are absent the white-*cell count is normal and the fractional test meal shows no evidence of achlorhydria* or hypochlorhydria The condition may occur at any age in either sex but is much

The treatment of occlusion is a surgical problem and in spite of improving technique is often unsatisfactory

TREATMENT OF IMPAIRED SPERMATOGENESIS

The hormones which may be used in the treatment of impaired spermatogenesis are the gonadotrophins and testosterone The results, however, are unsatisfactory. Chorionic gonadotrophin alone has no effect on the seminiferous tubules, and serum gonadotrophin (Injectio Gonadotrophini Serici, *B P*) which theoretically should stimulate spermatogenesis, is disappointing Failure of the latter is due to the formation of antibodies which counteract its effect (Rowlands and Spence, 1939) It may be tried in doses of 1,000–3 000 international units intramuscularly 3 times a week during alternate months A more promising preparation is a combination of chorionic gonadotrophin and the pituitary follicle-stimulating factor (Synapoidin), which may be given in doses of 2 millilitres (30 synergy rat units) intramuscularly 3 times a week

Testosterone appears to be concerned with the maintenance of spermatogenesis, but the therapeutic results in sterility are conflicting Small doses, such as 5 milligrams of testosterone propionate intramuscularly 3 times a week or 5 milligrams of methyltestosterone sublingually daily, are said to stimulate spermatogenesis (Rubinstein and Kurland, 1939)

It must be realized, however, that even with an effective preparation spermatogenesis cannot be stimulated if the germinal epithelium is destroyed Testicular biopsy will reveal the degree of atrophy or degeneration of the tubules and will indicate whether treatment is likely to be of any avail In cryptorchidism and eunuchoidism the tubules are usually completely degenerated, so that no response can be expected In a number of cases of aspermatogenesis, the condition is due to an inherent inability of the tubules to respond to stimulation and in these, too, treatment will be unsuccessful

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Harvey, C, and Jackson M H (1945) *Lancet*, **2**, 104 134
Jeffcoate, T N A (1946) *Brit med J*, **2**, 185
Rowlands, I W and Spence A W (1939) *Lancet*, **2**, 947
Rubinstein, H S and Kurland, A A (1939) *Sth med J*, *Nashville*, **32**, 499
Walker, K M (1945) *Proc R Soc Med*, **38**, 243

UNDESCENDED TESTES

Imperfect descent of the testes is present much more frequently in children in adults, indicating that in most cases spontaneous descent takes place The dence at birth is about 10 per cent, at puberty about 2 per cent, and in ma about 0 2 per cent

TREATMENT

It is important to diagnose the type of maldescent because this has a cons bearing on the treatment to be adopted No treatment is necessary in the r type of undescended testes, that is those which can be manipulated into the because these will descend spontaneously before or during puberty All

TETANY

(Parathyroid tetany—*See* hypoparathyroidism)

TETANY ASSOCIATED WITH MISCELLANEOUS DISEASES

Tetany may be associated with rickets, osteomalacia, coeliac disease idiopathic steatorrhoea and chronic nephritis The acute attack is treated as described in the section on hypoparathyroidism (page 611), except that the administration of para thyroid extract is unnecessary and undesirable *Treatment of the chronic state of*

nephritis, sufficient alkali is given to restore the alkali reserve to within normal limits The administration of calcium and calciferol corrects any tendency to tetany that may arise if the alkali is in excess

ALKALOTIC TETANY

Alkalosis causes tetany by diminishing the ionization of calcium The condition is produced by hyperventilation, by repeated vomiting and by excessive ingestion of *alkali*

Hyperventilation Tetany

Hyperventilation is a manifestation of hysteria or of a neurosis Alkalosis is *caused by excessive loss of carbon dioxide The acute attack of hyperventilation* tetany is treated by allowing the patient to breathe a 5 per cent mixture of carbon dioxide in air Sedatives such as bromide or one of the barbiturates may be of value in reducing the frequency of bouts of over breathing The underlying psycho-neurotic factor should be treated

Tetany due to Vomiting

The alkalosis is produced by excessive loss of hydrochloric acid and chloride in the vomitus It is treated by giving normal saline solution intravenously *or per* rectum in large amounts If necessary, calcium gluconate, 10–20 millilitres of a 20 per cent solution, is given intravenously or intramuscularly

Tetany due to Alkali

The only treatment usually necessary is to stop the administration of alkali If this is ineffective, 10 grains of the acid forming salt, ammonium chloride, are given and repeated if necessary

THYROID GLAND DISEASES

CRETINISM

HISTORICAL NOTE

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...on of
...ism

commoner in women after the menopause The intactness of the mucous membrane of the mouth, as well as the nose, appears to depend on an adequacy of oestrogen

TREATMENT

Buccal leucoplakia, unconnected with syphilis, stomatitis of the type described

ATROPHIC RHINITIS

nasal spraying with a solution of 0 5 milligram of oestradiol in 5 millilitres of oil twice a day Before spraying the nose should be irrigated with normal saline solution or 1 10,000 potassium permanganate solution and the crusts removed It *is uncertain how much the improvement depends on this preliminary hygiene and* how much on the action of the oestrogen

Kugelmass, I N (1946) *J clin Endocrinol*, 6 823
Mortimer H, Wright R P, and Collip, J B (1936) *Canad med Ass J*, 35, 503
— — — (1937) *Ibid*, 37, 445
Nathanson, I T, and Weisberger, D B (1939) *New Engl J Med*, 221, 556

SEXUAL PRECOCITY

True sexual precocity may be caused by tumours or chronic inflammatory lesions of the hypothalamus, or by pressure on the hypothalamus by a pineal tumour It may occur without any obvious cause, when it is termed constitutional or idiopathic sexual precocity It is also a feature of polyostotic fibrous dysplasia In pseudosexual precocity, ovulation and spermatogenesis do not occur In both sexes

tissue of the testis may be the cause

TREATMENT

pregnancy was unaffected It is considered that a concentration of 1 part of potassium iodide in 100,000 parts of salt would be preferable Other factors which would contribute to the elimination of goitre are the improvement in general hygiene and water supplies and the provision of a good mixed dietary, which should include an adequacy of sea fish

In the treatment of simple goitre any chronic infection should be eradicated In the early stages, iodine may be effective but it is unlikely to be of benefit in colloid goitres It is given as Lugol's Solution (Aqueous solution of Iodine, *B P*) in doses of 5 minims twice a day in milk. If, after 3 or 4 weeks it has failed to produce any reduction in size, thyroid (Tablets of Thyroid, *B P.*) should be given, starting with 1 grain daily and increasing to tolerance (3–5 grains daily) Thyroid inhibits the

pregnancy, the mother should be given 2 or 3 drops of Lugol's solution daily to prevent congenital goitre in the foetus

Chatin, A C (1852) *Gaz Hôp*, *Paris*, 25, 14, 38, 50, 86, 94
Coindet, J R (1820) "Découverte d'un nouveau remède contre le goître" *Ann Chim (Phys)*, 15, 49
Prévost (1830) Quoted by St Lager, J (1867)
St Lager, J (1867) *Etudes sur les causes du crétinisme et du goître endémique*, Paris

GOITRE—TOXIC

HISTORICAL NOTE

Toxic goitre was first observed in 1786 by Caleb Parry, and was noted in a *collection of his unpublished papers in 1825* In 1835, 3 cases were published by Robert Graves and 5 years later greater attention was drawn to the condition through the very full description by von Basedow (1840) Trousseau, in 1863, was the first to describe convincingly the beneficial effects of iodine (Trousseau, 1868) but it was not until many years later that treatment with iodine was generally adopted Marine and Lenhart (1911), Neisser (1920) and Loewy and Zondek (1921) wrote in favour of the use of iodine It is due to the work of Plummer in 1923 that the large doses at present employed became generally used as a pre-operative measure The first partial thyroidectomy for toxic goitre was performed in 1872 by Watson (1874) and in 1884 Rehn recommended the subtotal operation, which, [illegible] In 1943

DIAGNOSIS

Toxic goitre is a constitutional disease, which may or may not be associated with

AETIOLOGY

TREATMENT

Cretins are sometimes hypersensitive to thyroid and therefore the dose at first should be small—for a child aged 6 months, Tablets of Thyroid (*B P*) $\frac{1}{10}$ grain daily, increasing week by week to ¼–½ grain The maintenance dose varies in differ-

Fagge C H (1871) *Med-chir Trans*, 54 155

GOITRE—SIMPLE

HISTORICAL NOTE

Goitre was known to the ancient peoples and from the earliest times substances now known to contain iodine were used in its treatment Sea salt was known to be beneficial 2 000 years ago, and burnt sea sponge was a remedy in use from the times of the ancient Greeks Coindet a Swiss physician, was the first to use iodine for goitre in 1820 and he obtained good results Prévost, in 1830, first suggested that a deficiency of iodine might be the cause of endemic goitre and, in 1852, Chatin showed that this was so

Simple goitre is endemic in certain parts of the world, and in these parts most of the inhabitants are affected Elsewhere it occurs sporadically It is estimated that in England and Wales there are about 500 000 cases of simple goitre in persons of 5–20 years of age

PROPHYLAXIS AND TREATMENT

Experiments in various endemic regions have shown the value of iodine in diminishing the incidence of goitre In 1922 the Swiss Goitre Commission recom mended the introduction of prophylactic measures in the form of iodized salt, 1 part of potassium iodide in 200,000 parts of salt This reduced the incidence of goitre in schoolchildren from 100 per cent to 5 per cent, but the incidence during

those in whom the onset is recent, because in both these types early surgery is not usually indicated since a spontaneous remission may occur after the lapse of some months, (3) sometimes in childhood and during pregnancy, when it may be advisable to postpone operation, and (4) in old people who may not be able to withstand an operation All other cases should undergo subtotal thyroidectomy

Thiouracil is valuable as a pre operative measure in conjunction with iodine especially (1) in severe cases, in which it produces a greater reduction of thyrotoxicosis than does iodine alone, (2) in those patients in whom for some reason it may be desirable to delay surgery, (3) in those with nodular goitres, in whom there is usually little or no response to iodine, and (4) in those who have been treated for a prolonged period with iodine and have relapsed The use of thiouracil alone as a pre-operative measure is not recommended, since it produces a hyperplastic and very vascular gland which renders operation difficult

Thiouracil is unnecessary as a pre-operative measure in moderate cases with diffuse goitres, as with iodine alone the patient can be brought to a perfectly satisfactory state for operation The administration of thiouracil to such patients

failure

Thiouracil is contra indicated in patients with retrosternal goitre, as its administration may sometimes cause enlargement of the gland and secondly in these cases pressure on the trachea For this reason x ray examination is often advisable to determine whether this complication is present

USE OF THIOURACIL

The treatment of those patients in whom it is considered that thyroidectomy is not indicated will first be described After a preliminary period of 5 or 6 days to see ... its effect and less ... mes a ... time being about 4 weeks The flushing, sweating and nervousness disappear, the weight increases, the pulse rate and basal metabolic rate fall and the blood cholesterol rises Lid retraction may diminish, but exophthalmos is usually unaffected rarely it may be increased The goitre changes little in size but occasionally it may enlarge, and in some cases a reduction in size may occur Patients who have been receiving iodine for a few months before thiouracil therapy respond more slowly than those who have not been treated with iodine When the maximal improvement has been obtained, the dose is reduced to 50 or 100 milligrams a day and the patient may leave hospital and attend as an out patient at intervals of 3 or 4 weeks ... should be continued for a year or more when the drug is ... ss the disease has run its ... is a relapse after cessation

weight Toxic goitre is frequently complicated by auricular fibrillation, especially in older patients The cause of the disease is unknown, but it is generally agreed that it is not a disorder primarily of the thyroid gland It frequently arises in subjects with psychological disturbances, which may play a part in initiating the condition.

TREATMENT

General Measures

The fundamental cause of toxic goitre being unknown, treatment aims at promoting physical and mental rest and so reducing the amount of circulating thyroid hormone, which is responsible for the symptoms Inquiry should be made

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rate is
bolism

being raised and the store of liver glycogen being perhaps depleted, a high-calorie diet rich in carbohydrate is usually given

Vitamin B

Weiss and Wilkins (1936) suggested that, as increased metabolism raises the vitamin B_1 requirement of the body, a vitamin B deficiency may be present in certain cases of hyperthyroidism and may explain the occurrence of cardiac dilatation and cardiac symptoms This is more likely to arise in patients with a poor

given by mouth in doses of 50 milligrams daily

Sedatives

cutaneously; for insomnia, morphine, $\frac{1}{6}$–$\frac{1}{4}$ grain, may be administered subcutaneously during the first few days of treatment

Indications for Thiouracil and Thyroidectomy

The amount of circulating thyroid hormone may be reduced either by subtotal thyroidectomy or by the use of thiouracil, or one of its related preparations which acts by preventing the synthesis of thyroid hormone Opinions are divided concerning the choice of these two types of treatment The mortality rates with either method are about equal when the operation is performed by a surgeon experienced in this work. The arguments which have been raised against thiouracil are the very

It should be the aim, therefore, to operate during the period of maximal improvement, a subtotal thyroidectomy is usually performed at the end of the second week of iodine therapy Patients with auricular fibrillation should also be given digitalis to reduce the ventricular rate

Post-operative Iodine

For a few days after thyroidectomy there may be a marked rise in pulse rate, or auricular fibrillation may occur for the first time, both of these phases are temporary Subsequently, except for the exophthalmos, there is a great improvement in all the features of the disease Most patients feel better after taking 5 minims of iodine solution daily for 2 or 3 months after the operation and some may still require small doses of phenobarbitone during this period Thyroidectomy often restores a previously existent fibrillation to normal rhythm, but if this has not taken place within 2 weeks, it should be effected by means of quinidine in the usual manner If the ventricular rate is high, digitalis should be given for a week or two before employing quinidine The period of convalescence should be about 2 months

Pre operative methylthiouracil

When methylthiouracil is used as a pre-operative measure, iodine should always

maintained for about 4 weeks after the drug has been stopped Its use so materially improves the condition that, even in severe cases, subtotal thyroidectomy may be performed in one stage instead of the two stages which were often indicated in these cases before the advent of methylthiouracil, when reliance had to be placed on iodine alone

Patients with auricular fibrillation, in whom thiouracil is indicated as a pre-
s or Digoxin, as described under
Thiouracil sometimes restores
er cases If normal rhythm is
restored, there is no further need for digitalis therapy If congestive heart failure is present and there is much oedema, which may be slow to respond to digitalis, treatment with a mercurial diuretic (mersalyl, Neptal, Esidrone) is of value

When a secondary infection, such as tonsillar sepsis, is present, tonsillectomy should not be carried out until the patient is in a fit condition for the operation As a result of the beneficial effects of methylthiouracil, such an operative procedure can usually be safely performed before thyroidectomy

Post operative complications

as a result of the more careful pre operative
, 3 grains, should be
50 minims of Lugol s
d by half this amount
tion is present with a
s during the previous

Thiouracil in auricular fibrillation—Operation may not be indicated in the less severe cases of thyroid intoxication with auricular fibrillation Treatment with methylthiouracil alone may restore normal rhythm If it does not, subtotal thyroidectomy should be performed

replaced by iodine, for example, Lugol's solution, 5 minims 3 times a day, in order to avoid the possibility of producing enlargement of the foetal thyroid In severer cases, operation may be indicated

Glycosuria—The glycosuria of toxic goitre responds well to treatment with methylthiouracil and the presence of diabetes mellitus does not contra indicate its use

Toxic reactions

Toxic reactions to thiouracil or methylthiouracil are the result of an idiosyncrasy and occur in about 10 per cent of cases*, the commonest being fever, glandular enlargement and urticarial and maculo papular rashes On their appearance the

be normal one day and severely leucopenic the next Leucopenia may be a feature of toxic goitre, but white cell counts below 3,500 per cubic centimetre call for discontinuance of the drug If agranulocytosis is found, penicillin should be administered at once in full doses On discharge from hospital the patient should be instructed to report immediately should any of the symptoms mentioned appear The longer the period of treatment, the greater is the probability of toxic reactions These, too, are more likely to arise after repeated courses of the drug

SUBTOTAL THYROIDECTOMY

Pre-operative iodine

Those patients in whom a subtotal thyroidectomy is indicated should receive careful pre-operative preparation [illegible]

* These figures apply to cases treated with larger doses than those recommended in this article.

Dunhill, T P (1909) *Brit med J*, 1, 1222
Graves, R J (1835) *Lond Med & Surg J*, 7, 516
Himsworth H P (1943) *Lancet*, 2 466
— (1948) *Brit med J*, 2, 61

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Medicine Vol 1 London New Sydenham Society
Watson P H (1874) *Edinb med J*, 19, 252.
Weiss, S, and Wilkins R W (1936) *Trans Ass Amer Phys*, 51, 341

MYXOEDEMA

HISTORICAL NOTE

The clinical features of myxoedema were descnbed by Sir Wilham Gull, of Guy's Hospital, in 1874 William Ord in 1878 connected these changes with atrophy of the thyroid gland and proposed the name "myxoedema" In 1883 Theodore Kocher, of Berne, observed similar characteristics in patients after total thyroidectomy and Semon (1883) suggested that the common cause of cretinism spontaneous myxoedema and that occurring after thyroidectomy, was thyroid in sufficiency The beneficial results of grafting thyroid tissue were observed by Schiff in 1884 in thyroidectomized animals and by Bettencourt and Serrano in 1890 in a patient with myxoedema In 1891, Murray relieved the symptoms of myxoedema by injecting thyroid extract and Mackenzie (1892) and Fox (1892) by giving thyroid gland by mouth Murray s first treated patient died in 1919 at the age of 74 years In 1915, Kendall isolated crystalline thyroxine from the thyroid gland and in 1927 Harington and Barger synthesized it

DIAGNOSIS

The incidence of myxoedema is greatest in regions of endemic goitre Myxoedema is due to thyroid deficiency, which may be a sequel of simple goitre or of toxic goitre as a result of exhaustion atrophy Sporadic myxoedema may be caused by idiopathic atrophy or by fibrosis of the gland It is also produced by surgical removal of the thyroid gland, by excessive treatment with methylthiouracil and by prolonged administration of potassium thiocyanate, which is sometimes used in hypertension Methylthiouracil prevents the synthesis of thyroxine, and thiocyanate renders the thyroid gland incapable of absorbing iodine The principal features of myxoedema are a slowness of the mental processes and of voluntary movement loss of hair, dryness and thickening of the skin due to mucoid infiltration and a fall in the basal metabolic rate

TREATMENT

"The treatment of adult myxoedema is as perfect a form of therapy as any known to medicine" (Means, 1937) The results obtained by the daily administration of

3 weeks, it should be given by the intensive method The administration of oxygen by means of an oxygen tent is of great value in a severe crisis.

Rare sequelae of subtotal thyroidectomy are excessive gain in weight due to removal of too much thyroid tissue, hoarseness through injury to the recurrent

RADIOTHERAPY

... probably be used less ... which there is ... post operative relapse, in the majority of cases it brings about a relief of symptoms

RADIO-ACTIVE IODINE

Good results are being obtained with radio-active iodine taken by mouth. Treatment by this method is not generally available and is confined mainly to research clinics (*see* page 986)

TREATMENT OF POST-OPERATIVE ABDUCTOR PARALYSIS OF THE VOCAL CORDS

In post-operative abductor paralysis, breathing is difficult and stridor may be ...

always present in these cases, as in most cases of voice trouble (Cortlandt MacMahon, 1939) A much deeper pitch of the voice must be acquired, this is helped very much by the use of a tongue depresser to press the back of the tongue down ... The patient is shown how to ... demon- ... muscles, the larynx can be made to descend and be held low as the voice is produced, a very ...

easier and the noisy intake of air which may have been present disappears No ...

upward through the larynx

Astwood, H E. (1943) *J Amer med Ass*, 122, 78
Basedow, C. A von (1840) *Wchnschr f d ges Heilk*, 6, 197.

Kendall, E. C. (1915) J. Amer. med. Ass. 64, 2042

[illegible]

SUB-CLINICAL HYPOTHYROIDISM

The administration of thyroid may be of benefit in some conditions in which there is no obvious evidence of hypothyroidism. Since the normal variations of the basal metabolic rate are wide, the finding of a figure within normal limits does not necessarily indicate the absence of thyroid deficiency. The converse is also true, namely a low basal metabolic rate does not necessarily signify hypothyroidism.

Anaemia

[illegible] may be present in certain [illegible]

doses of 1 or 2 grains daily. The same is true in a few cases of pernicious anaemia.

Constipation

Constipation is one of the features of myxoedema and in this condition is prob- [illegible] the absence of signs [illegible]

The menopause

Myxoedema arises at the time of the menopause more often than at any other age-period and although sporadic myxoedema is a comparatively rare disease, milder forms of hypothyroidism are not uncommon at this time. Symptoms such as mild depression, lack of concentration, lack of energy, inertia and susceptibility to cold, which do not respond to oestrogens, may clear up with the administration of thyroid.

Debility

Symptoms of debility occurring in younger subjects may be manifestations of mild hypothyroidism and, consequently, may derive benefit from thyroid.

Chronic arthritis

Although evidence is lacking that chronic arthritis is ever due to or aggravated by thyroid deficiency, thyroid is said to improve a few cases.

Functional uterine bleeding and amenorrhoea

These conditions are sometimes benefited by thyroid, especially when they occur at puberty.

Adiposity

Adiposity, contrary to the popular belief, is rarely caused by hypothyroidism. Thyroid is widely used in its treatment, often without any *marked effect*. It is not a

dried thyroid by mouth amply testify to the truth of this statement. In choosing the preparation of thyroid to be used, it is advisable to employ one of known potency and to adhere to this, since the different brands on the market vary greatly in strength Changing from one brand to another is likely to lead to difficulties. The preparation given in the *British Pharmacopoeia* is standardized to contain 0·1 per cent of iodine combined as thyroxine. The use of some of the fancy preparations on the market, in which thyroid is combined with other substances, is unnecessary and unscientific. They have no virtues over simple dried thyroid. There is no advantage in using thyroxine. By mouth, it is less active than dried thyroid, because being relatively insoluble it is incompletely absorbed Oral administration of thyroid is preferable to the parenteral injection of thyroxine since the same result is obtained.

treatment with the full dose, because it may give rise to praecordial discomfort or even anginal pain The reason for this is that coronary sclerosis may be present: the

assessing the correct dose it is more important to take into account the general condition and the pulse rate than the level of the basal metabolism, since this varies so greatly in normal people A good plan is to increase the dose gradually until signs of overdosage appear, for example tachycardia and irritability. Treat-

caused by lack of muscular tone. It slowly and progressively returns to the normal size with thyroid medication. If it does not, some other cause for the enlargement is present.

Some degree of anaemia is common. It may be orthochromic, with a colour index of unity or just under, or hypochromic. The orthochromic anaemia is a manifestation of myxoedema and improves slowly with thyroid. The hypochromic

3 hourly irrigation with saline solution during the first day, as a rule, *there is no*

administration is continued for 48 hours after clinical cure

With this treatment, swelling of the lids generally subsides within 12 hours *after*

e com

0 units

per millilitre into the conjunctival sac (ii) *The baby is now placed on the nurse's* lap, while another nurse or helper sitting near by instils one drop of penicillin solution, 10 000 *units per millilitre, every minute for 30 minutes Irrigation is* not needed, as pus does not form to any extent, such thin mucoid discharge *as is present can be ignored, or, if it clings to the lid margin, may be wiped* away with moist pledgets of cotton wool (iii) At the end of this time there is

rge *The eye, however, is still*

tend to be sticky The baby is

drops is continued 6 times at

5-minute intervals, followed by a similar number of instillations at ½-hourly hourly, and 2 hourly intervals This gives a total of 22 hours' treatment Many cases require no further attention (iv) In some babies, the lid margins still tend to remain sticky It is advisable in such cases to continue with penicillin at 2 hourly intervals until the eye is dry, when treatment is carried on for a further 12 hours

Only crystalline penicillin should be used for making up the drops Impure penicillin is likely to cause irritative reactions Present-day methods of treatment should bring ophthalmia neonatorum under control within a few hours Any infant that has not improved markedly within 12 hours should be referred for expert treatment Likewise treatment at a special unit is called for in any baby showing a corneal ulcer Under competent treatment corneal ulcer should never develop

Purulent ophthalmia in adults

Local *penicillin therapy is as for ophthalmia neonatorum* Oral sulphonamide therapy requires full adult doses an initial dose of 6 tablets (3 grammes) of *sulphamerazine and a maintenance dose of 3 tablets* (1 5 grammes) at 8 hourly intervals (or at 6-hourly intervals if Sulphamezathine is used)

INFLAMMATORY REACTIONS

Chronic Conjunctivitis

Many cases labelled as chronic conjunctivitis are not infections, but are inflammatory reactions *of unknown origin The treatment of chronic conjunctivitis is* in consequence difficult Attention to general health and to any associated skin disease *or any anomaly of the lacrimal apparatus helps in some cases* In all cases, aggravation of the condition by the energetic use of antiseptics and antibiotics should be avoided

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good method of reducing weight since this cannot usually be achieved without causing symptoms of hyperthyroidism Thyroid addiction is known to occur

Other conditions

Thyroid is occasionally used in the treatment of chilblains, Raynaud's phenomenon, thinning of the hair, scleroderma and certain skin conditions, without, however, any definite benefit

THYROIDITIS

ACUTE

Acute thyroiditis is treated by rest in bed, analgesics for the pain and a kaolin poultice locally The causative organism is unknown, but the condition usually subsides in a few days Since, however, some cases may proceed to suppuration, it is advisable to treat the condition at once with large doses of penicillin, some cases respond dramatically to sulphonamide drugs If, in spite of these measures, suppuration occurs and there is evidence of pus, either by fluctuation or exploratory puncture, drainage should be instituted

CHRONIC

Chronic thyroiditis falls into two main groups—Riedel's disease or woody thyroid, and Hashimoto's disease These conditions are considered by many to be separate entities, although intermediate types occur (Graham, 1931)

Riedel s disease

In Riedel s disease, the thyroid is enlarged, hard and fixed by fibrous tissue to surrounding structures Histologically, the glandular structure is replaced by dense fibrous tissue, according to Graham (1931) these changes are unilateral in 50 per cent of patients The symptoms in addition to goitre, are dyspnoea, dysphagia and hoarseness due to compression of the trachea the oesophagus and the recurrent laryngeal nerve respectively Myxoedema may slowly make its appearance

Treatment consists of removal of the gland to relieve pressure on, and constriction of, the structures in the neck The resulting myxoedema or hypothyroidism requires treatment with thyroid

Hashimoto's disease

[illegible]

bo [illegible]

gl [illegible]

ho [illegible]

[illegible] If radiotherapy is unsuccessful, a subtotal thyroidectomy should be performed Any hypothyroidism is treated with thyroid

A. W SPENCE

Graham, A (1931) *West J Surg*, 39, 681
Hashimoto H (1912) *Arch klin chir*, 97, 219
Riedel, B (1896) *Verh dtsch Ges Chir*, 25, 101

CORNEAL ULCER

It is important to diagnose the nature of the corneal ulcer and to establish whether the ulcer is infected or not An infected corneal ulcer calls for expert attention as otherwise the eye will be lost An uninfected corneal ulcer, which may have many causes ranging from trauma to acne rosacea or other general disturbances, generally yields to simple measures After the danger of precipitating an acute glaucoma has been considered, eye-drops of atropine sulphate, 1 per cent, should be instilled, and a pad and bandage applied In most cases spontaneous healing occurs within a few days

Many apparently simple corneal ulcers tend to relapse Although the immediate treatment is fairly effective, relapses make the control of the condition a much more trying undertaking

Some specific types of corneal ulcer

Catarrhal ulcer —This is essentially a symptomatic lesion seen occasionally in acute conjunctivitis No special treatment is needed beyond the control of the conjunctivitis

Dendritic ulcer —Fluorescein staining generally leaves no doubt as to the diagnosis Treatment is not too satisfactory The usual symptomatic treatment of atropine and pad and bandage are necessary In addition the ulcer may have to be painted with Tincture of Iodine (*B P*) A protracted course is not uncommon, and relapses are not infrequent

Neurotrophic ulcers —Ocular complications in herpes ophthalmicus are *not uncommon* the two most common features being either loss of corneal sensation or a [illegible] trophic ulcers [illegible] hy should [illegible]

Phlyctenular ulcer —Here again there is no definite specific treatment The usual palliative measures of atropine drops and a pad and bandage have to be supple- [illegible]

[illegible] be multiple The diagnosis is [illegible] General treatment aiming at correcting any gastric abnormality as is present—achlorhydria or hyperchlorhydria —is a recognized, though not very effective, additional therapeutic measure

Mooren's ulcer, or rodent ulcer of the cornea —This is a grave condition in which the ulcer has undermined edges Both eyes are generally involved, though not necessarily simultaneously The condition generally ends in blindness X ray treatment given early may be helpful

INTERSTITIAL KERATITIS

A *child with interstitial keratitis may* have no other obvious stigmata of congenital syphilis or may show many signs of that condition, Hutchinson's teeth are probably the most common Attention to the general health and treatment *of the* underlying general infection, are almost as important as treatment of the invariably associated iritis This does not differ in any way from any other type of iritis, *and* need not be elaborated here

infection (subclinical infection) In some, resistance is not sufficiently good to overcome the infection so that clinical symptoms of tuberculosis appear An intermediate group in which the balance of infection and resistance is fine, responds with tuberculids, Phlyctenular ophthalmia belongs to this group its treatment therefore primarily involves attention to the general health

[illegible]

corneal involvement No other local treatment should be undertaken, such treatment only produces irritation and aggravates symptoms

The child with phlyctenular ophthalmia must be regarded as a potential victim of tuberculosis Once an acute phase has passed, a child should be under open air conditions—preferably something approaching a sanatorium regimen

Occasionally an acute attack may persist for weeks such cases may require expert treatment—which may include fever therapy (if the chest condition permits) or a course of streptomycin (10 milligrams per pound of body-weight given intramuscularly once in 24 hours for 28 days)

Toxic symptoms may develop during such a course, particularly after a total dose of 6 grammes has been reached Treatment must then be suspended

SPRING CATARRH

This too is an allergic reaction generally to pollens Eye-drops of adrenaline, 1 1,000, instilled 3 or 4 times a day may help to relieve the itching which is a *striking feature Here too irritation of the eyes from useless medication should* be avoided The only rational therapy is specific desensitization

THE CORNEA

FOREIGN BODIES

[illegible]

generally fail to remove any but the most superficial of foreign bodies

If a foreign body is not readily removed the practitioner should not persist. Unsuccessful attempts at removal of corneal foreign bodies may lead to an extensive traumatic corneal ulcer or even to perforation of the cornea

in the United States of America brucellosis has been incriminated Some acute attacks of iritis subside without further recurrences Unfortunately relapses are not uncommon

ACUTE IRITIS

Generally only symptomatic treatment is possible in a case of acute iritis for no exciting factors can be established Adequate local treatment is, however, imperative, for the consequences of an untreated or badly treated iritis can be disastrous The essence of local treatment is to keep the pupil dilated, this avoids a contracted pupil becoming blocked by exudate, and also avoids secondary glaucoma from the iris getting bound down and preventing drainage into the anterior chamber To keep the pupil dilated, drops of atropine sulphate, 1 per cent, should be used as frequently as the severity of the condition compels In mild cases the iris can be kept dilated by instilling drops once every 3 hours or so In severe cases more frequent application may be necessary as otherwise the pupil tends to contract, where this threatens to occur it is advisable to use subconjunctival injections of Mydricain (5 minims of adrenaline containing atropine sulphate, $\frac{1}{120}$ grain, and cocaine hydrochloride, $\frac{1}{20}$ grain) Subconjunctival injection should be made after the conjunctiva has been anaesthetized by the usual application of cocaine drops A tuberculin syringe and needle are best

Apart from atropine and Mydricain, heat in the form of hot fomentations or the electric dry heater, is helpful Atropine treatment should not be suspended until the eye is free from all irritability

Occasionally irritation develops in the course of treatment with atropine Possible substitutes are duboisine, 1 per cent, hyoscine, $\frac{1}{4}$ per cent, and—very much less satisfactory—Lachesine ("E3"), 1 per cent

The tendency to use homatropine and cocaine instead of atropine for the treatment of iritis for fear of precipitating glaucoma is to be deprecated It does not give the full effect and carries with it the danger of a secondary glaucoma from incomplete treatment of the iritis

RECURRENT IRITIS

Any patient with recurrent iritis presents a difficult general and ophthalmic problem, and should be referred for expert treatment

CHRONIC IRIDOCYCLITIS

Chronic and quiet iridocyclitis present all the difficulties and complexities of the relapsing acute iritis During acute recrudescences the same treatment as for acute iritis should be carried out

LACRIMAL SAC

CONGENITAL LACRIMAL OBSTRUCTION

In the newborn there is not infrequently an accumulation of secretion, sometimes muco purulent, at one inner angle This arises from imperfect canalization of the naso-lacrimal duct leading to stasis in the lacrimal sac, and ultimately regurgitation

METATARSALGIA

Pain in the metatarsal region is a *common complaint, four* distinct syndromes can be recognized

Morton's Disease

In this condition there are attacks of sudden severe lancinating or cramp-like pain The attacks generally occur during walking in a shoe and the pain is well localized, usually, to the third and fourth metatarsal heads There may be pins and needles referred into the toes often the patient obtains relief by flinging off her shoe and squeezing the metatarsals *together This is the typical syndrome which* was described by Morton (1876) and for some time its aetiology was a mystery

Treatment

The painful attacks are now recognized as being due to plantar digital neuritis and the condition is cured by resection of the affected portion of the digital nerve through a plantar incision in the appropriate intermetatarsal space At operation there is seen to be a fibrous thickening of the epineurium Non operative palliative treatment is of little value in this condition

Excessive Pressure on the Heads of Metatarsals

During normal standing and walking the metatarsal heads are protected from excessive pressure by the supporting action of the long flexor tendons assisted by the interossei and lumbricales When the toes become clawed at the metatarso-phalangeal and interphalangeal joints, the protective action of these muscles is reduced and undue pressure falls on the heads of the metatarsals In conditions such as ... not take its

Treatment

In many cases radical treatment of the cause of the disability *such as* pes cavus hallux valgus, hallux rigidus or hammer toe may be indicated as a preliminary step In all cases the tone and power of the intrinsic muscles of the toes should be improved or restored to normal by exercises and faradic foot baths At the same time the metatarsal region is supported by an insole of sponge rubber with a pad lying *transversely beneath the necks of the metatarsals* When calluses are an additional source of pain regular skilled chiropody is indispensable and then a felt pad secured with adhesive strapping is of value as a temporary support

Arthritis of the Metatarso-phalangeal Joints

Any of the varieties of acute or chronic arthritis may affect one or several of these joints and give rise to pain in the metatarsal region *The metatarso* phalangeal joints are frequently involved in cases of rheumatoid arthritis and crippling *painful* deformities may arise here unsuspected in the patient who is in bed and *receiving* ... for the same affection of the hands and shoulders The *capsular* ...ded

d

of the stagnant decomposed fluid Although there is no urgency, it is probably best to break down the obstruction in the naso-lacrimal duct by probing Some cases

CHRONIC DACRYOCYSTITIS

This condition, most frequent in middle aged women, is also due to an abnormality in the naso lacrimal duct Mild cases occasionally yield to frequently repeated syringing of the sac—a simple enough procedure

Technique —The conjunctival sac is anaesthetized by the instillation of 2 drops of 4 per cent cocaine 3 times at intervals of 2–3 minutes, the lids being kept closed The lower punctum is dilated with a Nettleship dilator inserted vertically into the punctum and then brought down horizontally. Through the dilated punctum 2 millilitres of sterile water are expelled from an ordinary syringe armed with a blunt-pointed lacrimal needle

Probing as a method of treatment has proved unsatisfactory. In most cases, surgical treatment is necessary if the symptoms are at all severe

ACUTE DACRYOCYSTITIS

Any long-standing chronic dacryocystitis implies an infected sac Such an infection may flare up acutely, producing an abscess. Surgical removal of the sac at this

condition has been quiescent for some months, excision of the sac or some other radical method of surgical treatment has to be undertaken, if only to avoid further attacks

EPIPHORA

instillation of drops of zinc sulphate, ½ per cent, at frequent intervals during the day

LID AFFECTIONS

Of the three significant affections of the lids, two—styes and chronic blepharitis—are largely problems associated with general health The third—meibomian cyst—is an aspect of minor surgery

although the onset is more usual after the age of 20 years It is a commonplace that symptoms arise later in life in a patient in whom the deformity has been present for years without discomfort

SYMPTOMATOLOGY

The symptoms should be considered in groups.

Chronic foot strain

The deformity, by altering the mechanical conditions under which the foot works can throw abnormal strains on the ligaments of the tarsal and metatarsal joints thus producing pain in the foot Pain may be generalized or localized to the metatarsal region

Bursitis

A bursa forms over the exostosis on the medial surface of the head of the first metatarsal and this bursa frequently becomes inflamed The affection may be acute and go on to suppuration, or it may be of a chronic and recurrent nature

Displacement of the second toe

In severe deformities the hallux crosses the second toe and pushes it upwards and backwards The second toe becomes clawed and is gradually displaced on to the dorsum of the head of the second metatarsal so that the metatarso-phalangeal joint is dislocated Pressure of the shoe on the clawed and displaced toe produces painful corns and what is of more significance the head of the second metatarsal is pressed against the sole of the shoe, so that a very intractable form of metatarsalgia may arise

Arthritis of the first metatarso-phalangeal joint

Occasionally the patient will complain of aching in the deformed joint and there is clinical evidence of osteoarthritis However, in this condition radiological changes are slow to develop

Difficulty in shoe fitting

Sometimes the principal or even the only complaint will be that shoes broad enough to avoid pressure on the bunions cannot be bought

PREVENTIVE TREATMENT

Here again the aetiology of the condition is obscure In some cases there is undoubtedly an inward deviation of the first metatarsal which occurring in adolescence leads to deformity at the metatarso phalangeal joint It has been said that this inward deviation of the metatarsal is atavistic and the recurrence of a prehensile digit, but Wood Jones (1944) brings up convincing evidence that the foot in the human race has not been evolved from a grasping organ The inward *deviation is*, therefore, in the nature of a congenital maldevelopment Whatever may be the cause of deviation those children and adults in whom it exists will develop a *hallux* valgus unless great care is exercised to see that shoes and stockings are long enough and broad enough

may continue even when the patient is resting

Treatment

movement at the metatarso-phalangeal joints as the result of infective arthritis, trauma or chronic foot strain, recovery can sometimes be hastened by a manipulation This method is of particular value when movement is only slightly restricted, when there is no deformity, and when the condition is of fairly recent origin.

MARCH FRACTURE (*PIED FORCÉ*, OR FATIGUE FRACTURE)

This well-known affection is not to be forgotten when a patient complains of pain in the metatarsal region. The pain is, of course, situated more proximally than in those conditions which have been described and there is a more or less localized tender area on the shaft of one of the metatarsals, usually the third or fourth. A

Treatment

applied without hesitation

HALLUX VALGUS

The deformity is remarkably common amongst women and unusual in men. Deviation of the great toe outwards may first become apparent during adolescence

heels or low cuban heels The shoes should fit well at the waist and a low valgus insole should be incorporated *The sole must obviously be broad and there must be* plenty of room in the uppers which are made of soft leather There should be no toe-caps Shoes of this type, if well made, are not unsightly and it is often surprising how much comfort they can provide

to the full radical operation when deviation of the hallux is not marked although there is a large troublesome exostosis and bursa

Surgical Treatment of Hallux Valgus

The operations applicable to the condition are (1) resection of exostosis and bursa, (2) Mayo's operation in which the head of the first metatarsal is partly *removed, (3) Keller's operation in which, after resection of exostosis and bursa* from the first metatarsal, the proximal third of the first phalanx of the great toe is removed, and (4) Girdlestone's operation in which the head of the metatarsal is partly removed and the resected base of the proximal phalanx is inverted and sutured to it

Operations for hallux valgus have in the past gained a somewhat doubtful reputation The selection of cases for operation requires considerable judgment and experience and there is no doubt that if the various symptoms which attend the deformity can be relieved by conservative measures operation should not be advised The success of any of the surgical procedures depends on very careful and persistent attention to post operative exercises as much as on an adequate operation Exer cises are begun on the third day after operation and are designed first to regain muscular control over the hallux, then to mobilize the metatarso phalangeal joint, *next to strengthen and mobilize all the muscles of the feet and toes,* and finally to teach the patient to walk Walking is not allowed until the operation wound is soundly healed and until a satisfactory degree of muscle control and mobility has been achieved by non weight bearing exercises The patient should not be dis charged to "out patient" treatment until able to walk without pain and taking the weight fully and confidently on the hallux

HALLUX RIGIDUS

— , ..g feature

osteoarthritis elsewhere *Trauma is a frequent cause,* not only the ... injuries but in addition the repeated minor traumas of football and those occasioned in adolescent life, by wearing boots which are too small

Symptomatology

Hallux rigidus may be present for many years without causing symptoms or disablement As in osteoarthritis elsewhere virtual ankylosis of the joint may be

acting on the foot, especially the short plantar muscles Whether these exercises can be effective in preventing the deformity is a moot point, but they are certainly of use in averting the onset of symptoms

SYMPTOMATIC TREATMENT

Chronic foot strain

The usual treatment by exercises and possibly manipulation will be required and this may restore comfort to the patient's foot without more radical treatment of the deformity

Bursitis

Acute inflammation of the bursa should be treated on the same lines as an acute

sary time, relief can be secured by protective padding A semi-circular felt pad is placed behind and below the bursa and secured by turns of strapping which support the whole metatarsal region Recurring attacks of bursitis may provide the main indication for radical operative treatment of the deformity

Displacement of the second toe

An uncomfortable and displaced second toe is another indication for operative correction of the hallux valgus It may be possible to make the toe comfortable by regular chiropody and by wearing a loose fitting shoe The metatarsalgia which results from downward pressure on the head of the second metatarsal may prove very resistant to treatment a metatarsal support from an experienced appliance maker may suffice Often displacement of the second toe is so marked that only amputation of that toe through the metatarso-phalangeal joint will give relief from discomfort and this amputation may well be combined with radical operation on the hallux in intractable cases

Arthritis of the first metatarso-phalangeal joint

Chronic pain in the deformed joint is again an indication for operative correction In mild cases, or in those patients in some way unsuitable for operation, relief may be secured by exercises, by manipulations and by roomy shoes.

Difficulty in shoe fitting

younger individuals In either case the symptoms may be in both heels or confined to one Both forms are consequent upon inflammatory changes in the plantar fascia and attachments of the short muscles of the foot to the calcaneum. The source of infection is not usually obvious and in some cases inflammatory changes may be due to repeated mild traumas when the fatty tissues of the heel have wasted An x ray examination will often reveal a short spur of bone projecting forwards from the under surface of the calcaneum This spur is usually considered to be a mere incident in the syndrome and its appearance is not regarded as an indication for its removal by operation Indeed the spur will often be present on both sides

recurrent tonsillar infection It may be due to a gonococcal infection

It must not be forgotten that an undiagnosed fracture of the calcaneum may be a cause of painful heel X ray examination is always advisable especially if there is any history of injury

TREATMENT

If the pain is severe, rest in bed is justified and it is essential in acute attacks of plantar fasciitis There must be a search for a septic focus, and an active or latent tonsillitis or gonorrhoeal infection will require treatment. Short wave diathermy is particularly efficacious in this condition Once the acute symptoms have cleared up exercises are begun to restore the tone and power of the muscles controlling the feet and toes When the patient begins to get up and in milder cases during ambula tory treatment, the soft tissues of the heel need to be protected from pressure As a temporary measure a piece of Zopla felt padding is cut to fit inside the heel of the shoe The felt pad should be ¾ inch thick and is hollowed out at its centre to accom modate the tender under surface of the heel For more permanent protection a complete insole of sponge rubber is made to the patient s measurements the heel being thickened and hollowed out at its centre

W D COLTART

Jones F Wood (1944) *The Foot* London Baillière Tindall & Cox
Morton T G (1876) *Amer J med Sci*, 71, 37

painless, and it is the joint in which movement is limited, but not obliterated, which is painful The onset of symptoms may follow some minor injury, or after a period of excessive walking or standing

There are two groups of symptoms (1) general discomfort and pain in the affected joint, and (2) local symptoms of painful pressure from an osteophyte on the head of the first metatarsal

As in all other disabilities of the foot it is possible that a secondary foot strain may arise affecting either the tarsal or outer metatarso-phalangeal joints

PREVENTIVE TREATMENT

Because hallux rigidus so often begins in childhood it is important to take notice of any complaint by a child, of pain in the big toe, and to treat minor sprains and injuries of that toe with an adequate period of rest Stockings or shoes which are too short must obviously be avoided

SYMPTOMATIC TREATMENT

Painful joint

The operative treatment of hallux rigidus has been the subject of bad report just as in hallux valgus Here again the case must be carefully selected The operation must be skilfully performed, and the after treatment is of great importance The usual procedure is Keller's operation with resection of the prominent osteophyte from the rim of the articular surface of the head of the first metatarsal Both Mayo's operation and Girdlestone's operation have a place in the treatment of this condi- [illegible]

Physiotherapy is sometimes of value and short wave diathermy will relieve pain, when a good deal of movement remains at the joint, mobilizing exercises are worth a trial but in this condition as in other forms of osteoarthritis it is wise to desist quickly from mobilization of the joint if it is not proving successful in the relief of pain

Painful osteophytes and bursitis

[illegible] be required

As in hallux valgus an inflamed bursa may need local treatment.

PAINFUL HEELS

Pain localized to the plantar surface of the heel may occur (1) as a chronic symptom in elderly people, or (2) as a more acute and more disabling pain in

symptoms of food poisoning Allergy to certain foods, such as shell fish, may cause marked abdominal symptoms In cases of acute food poisoning careful inquiry should be made as to what foods (especially any unusual foods) have been eaten recently Any suspected foods should be kept together with specimens of vomit and faeces, which should be sent for laboratory examination The Medical Officer of Health should be notified.

TREATMENT

Preventive

The prevention of food poisoning begins with the inspection of food for human consumption, particularly milk and prepared foods, such as cured meat, sausage-

day before it is

being cooked,

micro-organism

used in serving it Lastly, anyone who handles food should wash his hands

Remedial

Rest in bed is essential and, initially, only water or dilute saline solution (1 teaspoonful to 2 pints, with glucose), say 6 ounces hourly, should be given In less severe cases, a mixture of bismuth and opium may be given 4 hourly in water to alleviate the diarrhoea and vomiting

Tincture of opium	10 min	0 6 ml
Sodium bicarbonate	10 gr	0 6 g
Bismuth carbonate	30 gr	2 0 g
Mucilage	sufficient quantity	
Chloroform water, to	1 fl oz	30 ml

Atropine sulphate $\frac{1}{100}$ grain (0 6 milligram) may be given by mouth 4-hourly to relieve abdominal pain Codeine phosphate, $\frac{1}{2}$–1 grain (30–60 milligrams), is given by mouth to relieve tenesmus, or a starch and opium enema may be more effective

If vomiting and diarrhoea are severe, 2,000 millilitres of 5 per cent glucose in normal saline solution may be given intravenously in the first 12 hours Brandy,

2 teaspoo

excessive

sulphate,

washed out with 6 pints of water containing a tablespoonful of sodium bicar-

bonate

In the severest cases with circulatory collapse, intravenous administration of glucose saline solution is essential and plasma may be needed (*see* section on Dehydration, page 529) Nikethamide, 2 millilitres, should be given intramuscularly 4-hourly

FOOD POISONING

BOTULISM

This rare form of food poisoning is caused by the anaerobic spore forming organism found in the intestines of animals and in the soil It produces an exotoxin

extremities occurs but there is no sensory loss

TREATMENT

The stomach should be washed out with warm water The colon also should be washed out to get rid of retained toxins Saline aperients are given to correct constipation which is a feature of the disease A polyvalent anti botulinus serum is given intramuscularly daily until there is definite improvement or until the case is hopeless To be effective, the serum must be given at the earliest possible moment before the toxin is fixed to the nervous tissues This serum retains its potency for about 3 months only

In Great Britain, the Ministry of Health, Whitehall, London, S W 1 (Tel Whitehall 4300) or the Department of Health for Scotland, St Andrew's House, Edinburgh 1 (Tel Edinburgh Central 2500) should be consulted

FOOD POISONING, ACUTE

Food poisoning causing the symptoms of acute gastro-enteritis may be due to the contamination of food by organisms, particularly the salmonella group and the staphylococci, which are prone to develop enterotoxins The staphylococcus needs

allow the staphylococcus to grow well and these may be a cause of outbreaks of food poisoning The salmonella group is an important cause of food infection The organisms may exist in incompletely cooked meat, food or milk may be con-

be boiled for 10 minutes Dried egg has also been found to harbour salmonella organisms and must be properly cooked Occasionally, food poisoning may be caused by some other factor, food may be contaminated by chemical substances, such as arsenic, zinc, lead or food preservatives Poisonous foods may be taken by mistake, such as poisonous mushrooms, wild parsnips, rhubarb leaves, or raw sprouting potatoes Honey containing nectar from azaleas or rhododendrons may cause

GASTROENTEROLOGY

BELCHING AND AEROPHAGY

Fermentation of food in the stomach is seldom, if ever, the cause of belching The usual cause is the eructation of wind after swallowing air As a result of some abdominal discomfort, *possibly colon spasm but occasionally an intra abdominal* organic disease, the patient attempts to bring up wind but, in trying to do so, he merely swallows air and quickly inflates his fundus, finally relieving himself with a loud belch

In some patients, an air lock may develop after inflation of the fundus There is distortion of the cardiac sphincter and the air cannot be regurgitated The patient makes further attempts to relieve his discomfort and swallowing more air only increases his discomfort Occasionally this may cause very severe pain Such cases may be associated with unusual configuration of the fundus, a *cascade stomach* or undue mobility of the stomach so that actual rotation or volvulus of the organ may occur In such cases it may be necessary to pass a Ryle's tube or an oesophageal tube to relieve the distension of the stomach and ease the pain These cases are, however, rare and the majority of patients with aerophagy can be encouraged to stop trying to bring up wind and the simple instruction to open the mouth when there is a desire to eructate may prevent the swallowing of air

It must be remembered that this symptom may be associated with an anxiety state, a psychoneurosis, or with organic disease of the stomach or bowel and the appropriate treatment of the underlying condition will be needed

F AVERY JONES

CONSTIPATION

INTRODUCTION

This article deals with essential constipation, that is to say with constipation in *which gross organic disease of the digestive tract is excluded* Some years ago it was thought that the contents of the bowels were poisonous and that health was [illegible] This opinion led to the abuse of laxatives [illegible] salts every morning [illegible] loose stools every [illegible] was a serious and [illegible] ect [illegible] di [illegible] ey [illegible] are tired easily and lost weight The clinical picture of a patient whose [illegible] habitually empty is one of subnutrition, a sallow complexion and a dry skin Green vegetables and salads cause flatulence, eggs fried food and other kinds of fatty

Milk is best avoided initially, but as improvement begins skim milk and water in equal parts, warm weak tea and soups may be given and a bland dietary gradually increased by the addition of toast, rusks and other starchy foods Foods containing fat are withheld until diarrhoea has ceased for at least 24 hours

SPECIFIC

Chloromycetin may be given if the acute symptoms persist for more than 6 hours, as it is reported to be effective in certain salmonella infections namely [illegible] and *S San* [illegible] s The total [illegible] weight given [illegible]

MUSHROOM POISONING

Many species of mushroom are poisonous to man, particularly the death cap (*Amanita phalloides*) which has white gills, unlike those of the ordinary edible mushroom which are never white The symptoms appear usually after a latent period of 8 hours or more, with vomiting diarrhoea and severe abdominal pain, followed by collapse and death from liver failure In other cases, symptoms may come on quickly, either from an allergic response or from the effects of muscarine on the brain, causing delirium and hallucinations This may follow the eating of *A muscaria*, which has a red cap with white patches An excellent account of mushroom poisoning and its treatment has been given by Birch (1948)

TREATMENT

Atropine, $\frac{1}{50}$ grain, should be given intravenously to an adult as an antidote to muscarine like alkaloids It is best to wash out the stomach and leave in 2 fluid ounces of a 33 per cent solution of Epsom salts $\frac{1}{2}$ ounce doses of Epsom salts may be given hourly until the bowels act After testing for sensitivity 40 millilitres of anti phallinic serum may be given intramuscularly or intravenously This serum [illegible]

[illegible] stomach survive for several days and, if rabbit s brain is added, they recover com- [illegible]

F M AVERY JONES

Birch C A (1948) *Emergencies in Medical Practice* Edinburgh, Livingstone
Seymour F R (1932) Mushroom Poisoning (translation of an article by Limousin, M H H., and Petit, G) *Brit med J*, 2 220

body for food and is also normally empty That this is a physiological fact is known to anyone who uses a sigmoidoscope

As result of mass peristalsis, of overfilling of the pelvic colon or of voluntary muscular effort, food residues enter the rectum and quickly distend its walls A desire to empty the bowel is felt and, given the opportunity, defaecation follows, partly caused by voluntary effort and partly as a result of a highly complicated

scending colon and perhaps the distal third of the transverse colon The normal evacuation is in two parts The first empties the rectum and pelvic colon, and after an interval which may be a minute or two, there is a further small evacuation of looser material which presumably comes from parts of the colon proximal to the pelvic colon In x ray examinations of a normal bowel the descending and iliac colon are generally empty, containing neither barium nor gas, in contrast to the proximal colon which tends to collect gas when it is empty of semi-solids Medical men who are observant of these things may consult a colleague on account of a change in their habit of defaecation and report that it occurs as a single action, whereas the normal habit in the past in their experience has been that it has occurred, as described above, in two actions Complaint of such a minor alteration of function might be regarded as a neurotic symptom, but it is, on occasion, one of the earliest symptoms of, for instance, a carcinoma of the stomach, duodenal ulcer, diverticulosis or carcinoma at the pelvi-rectal angle of the colon

As a result of defaecation the rectum and pelvic colon are emptied completely of food residues On this hypothesis incomplete emptying of either the rectum or pelvic colon is as much constipation as is a wholesale delay in the passage of food residues through the colon as a whole Incomplete evacuation of the rectum, as much as complete failure of the rectum to empty its contents one day, is a cause of a variety of symptoms including a sensation of local fullness or discomfort, and

fossa Incomplete emptying both of the rectum and of the pelvic colon may be a cause of intestinal flatulence and other remote effects in the proximal parts of the digestive tract and of reflex effects on other organs, especially a feeling of dullness or lethargy, headache, biliousness and loss of appetite Incomplete evacuation of the rectum is easily diagnosed by the patient's symptoms or by rectal examination The symptoms of incomplete evacuation of the pelvic colon are less easily recognized It may indeed require a barium meal x-ray examination to establish the diagnosis Nevertheless it may be the reason for a person taking an excessive dose of laxative, seemingly unnecessarily, every day It may be also the cause of disordered function of the caecum with symptoms simulating appendicitis, in more extreme forms when associated with a dryness of the pelvic colon it may lead to sigmoiditis, and it may be one of the causes of ulcerative colitis According to this view of bowel function it is obvious that from the point of view of health and the prevention of disease, *completeness* of function is as important as *regularity* of function

food cause biliousness, and on account of a formed stool never being passed through the anal canal there is a tendency to develop a fibrous anus. Owing to the rather continual and excessive irritation of the intestinal tract by laxatives taken

PHYSIOPATHOLOGY

These rather extreme views about constipation have been modified as a result of a clearer appreciation of the normal working of the digestive tract (Best and Taylor, 1945) and more especially as a result of the work of Hurst (1919) and of Alvarez (1940)

A useful working hypothesis for clinical practice distinguishes the proximal from the distal colon The proximal colon includes the caecum, ascending colon, hepatic flexure and transverse colon, probably as far as the junction of the proximal two-thirds of the transverse colon with its distal third The distal colon includes the

digestive tract part of the food eaten at breakfast one morning is evacuated after breakfast the next day. But the proximal colon has some power of selection and some food residues, particularly cellulose, are normally retained in the proximal

normal content of the proximal colon as is air a normal content of the lungs; if the colon is emptied of food residues it loses vitality and thereby loses the selective

the food residues reaching it are fluid or semi-fluid, by the time they reach the rectum they are solid or semi-solid. In the distal colon, too, the offensive smell of the contents of the proximal colon is changed to the ordinary smell of normal faeces.

The function of the pelvic colon is comparable to the function of the stomach in that the former is a receptacle for food residues before their evacuation, and the latter is the receptacle for food before it is passed on to the small intestine for digestion and assimilation The rectum is the way out of the body for food residues and is normally empty It is comparable to the gullet, which is the way into the

reflex activity is the movement of food residues from the proximal to the distal colon and from the pelvic colon to the rectum which sets up the defaecation reflex due to sudden distension of the rectum Owing to a time lag in the initiation of th s reflex the mass peristalsis takes place some time after food enters the stomach Th s interval may be from half an hour to an hour and in this case it is important that the individual should not have to hurry out of his house until ½–1 hour after beg nning breakfast It is the sudden distension of the rectum which most surely puts the defaecation reflex into action and if this reflex is voluntarily restrained the rectum may accommodate itself to its contents and any effort at defaecation at a later time may be ineffective Further activity such as hurrying to catch a train or bus or driving a motor car may inhibit this reflex and so lead to a constipated hab t The habit of constipation may be cured by such simple means as drinking a glass of hot or cold water on waking in the morning (hence the morning cup of tea) because hot or cold fluid is more effective in determining mass peristalsis than tepid fluid alternatively eating something such as an apple before breakfast may be equally effective It is also a help towards normal bowel function if a person gets up in good time in the morning so that he or she is not hurried over dressing or eating breakfast Tobacco smoking after breakfast may be a stimulant to bowel function Some people live habitually over tired they require to be woken in the morning because their night s sleep is incomplete and when woken they feel tired until they are stimulated by caffeine food exercise or the interest of the day s work If inquiry into a person s habits suggest a state of over fatigue this should be remedied because chronic constipation may be the first or only symptom of over fatigue

EMOTIONAL CAUSES

The ordinary emotional reactions of life are liable to affect bowel function causing loss of appetite nausea flatulence diarrhoea or constipation according to the intensity of the stimulus and the individual s constitutional make up A person may be well aware of his emotional state and know that it is due to lack of outlet frustration or defeat It may be possible to replace these negative attitudes with something positive such as acceptance and the simple change of heart which this word implies may restore the digestive tract to normal function On the other hand some people for various reasons perhaps because their emotional state is of such long standing that they have become accustomed to it or perhaps through lack of courage they refuse to acknowledge it even to themselves may require some help

es especially in
njustice done to
bowel funct on

they all tend to cause a state of nervous or emotional exhaustion which is an

DIET

The foods which promote intestinal activity are especially fruit vegetables and salads on account of their cellulose content and the stimulating effect of the organic acids which they contain Some fruits are more laxative than others namely prunes

Any disorder of the anal canal or anal margin is liable to lead to constipation, that is to say to a failure of evacuation of the lower bowel, unless stimulated by laxatives or some other means, or to incomplete emptying of the rectum or pelvic colon In the treatment of constipation it is, therefore essential to examine the anal canal and anal margin, and by the treatment of any condition of disordered structure such as fibrous anus, haemorrhoids, fissure or fistula, to restore normal structure and so remove a local interference with the complex reflex mechanism of *defaecation*

It is obvious from this brief summary of the normal working of the large bowel that a proximal colon that is kept too empty by the habitual use of laxatives, will be subject to flatulent distension, loss of vitality and loss of opportunity of performing its normal digestive function On the other hand a rectum that is not normally empty and especially a pelvic colon that does not empty completely at the time of defaecation, is prone to local disease and liable to cause considerable functional disturbance and discomfort over a wide area elsewhere in the body In short the object of the treatment of constipation is not simply to determine regular bowel action every day but to restore normal function

TREATMENT

Habits

Organs are as liable to develop habits as are individuals Many habits which to the uninformed seem to be personal are in fact organ habits An example of this is the woman who wakes at 2 o'clock every morning to attend to her sick husband, after his death she continues to wake at the same time in the night, because her

him he may in consequence develop the laxative habit A good bowel habit is *encouraged by the practice of defaecation at the same time every day, because one* of the factors that assist defaecation is the passage of 24 hours of time

Posture

A second factor is the upright posture Individuals who have an irritable intestinal tract, which may be congenital or may be acquired as result of residence in tropics experience a call to stool on first getting up from bed in the morning This factor may be made use of in patients who are more or less confined to bed It is common practice to allow a bed patient up for ½ hour in the late afternoon or evening when he is tired If the patient's time out of bed is so limited it may be better for him to be up in the morning when he is refreshed by his night's sleep, and when the upright posture and a little walk round his bedroom may stimulate normal bowel function

Gastro-colic Reflex

A third factor is the gastro-colic reflex, the effective stimulus to which is food or fluid entering the stomach and the effect is a downward movement of intestinal contents through the small and large intestine by mass peristalsis The effect of this

however, some forms of constipation, perhaps especially pelvic colon constipation, which are constitutional and inherited functional disorders Equally there are forms of constipation due to acquired disabilities such as haemorrhoids or the

...lt as on the
and which
lomel, blue

pill and grey powder, and (d) olive oil, castor oil, paraffin oil, sulphur and phenolphthalein

Saline cathartics

These are taken with water on waking in the morning A bowel action follows in 1–2 hours They have the advantage of convenience, and being taken with water extra fluid is drunk and the water itself tends to excite the gastro colic reflex Saline cathartics most generally used are sodium sulphate, magnesium sulphate and sodium phosphate They require to be dissolved in hot water and have a somewhat unpleasant taste, hence proprietary preparations which are effervescent and have a more agreeable flavour, or which can be dissolved in cold water, are generally preferred The general indication for the prescription of saline cathartics is a state of congestion in some part of the digestive tract Thus they may be suitable for individuals who have gastric catarrh (such as may be due to intolerance to alcohol) or irritability of the stomach due to some other cause (as may be suggested by aerophagy, belching wind and heartburn) Although these salts do not act directly on the liver, they are indicated in cholecystitis and liver congestion They may be prescribed with advantage in some cases of congestive heart failure and there is an indefinite indication for their use in hypertension and cardiovascular sclerosis They are contra indicated in tired and asthenic persons when peristalsis is sluggish and the colon atonic Their disadvantage is that they may cause wind, gurglings and loose stools, and they may determine or aggravate haemorrhoids

Vegetable purgatives

Those in common use include aloes, rhubarb, senna, cascara and frangula, belonging also to this group are jalap, colocynth and scammony, which are little used nowadays Podophyllin varies in its composition and is little used Aloes and rhubarb are probably the best drugs for the treatment of chronic constipation, especially when the constipation is due to a failure of the evacuating mechanism Both drugs act entirely on the large intestine, they tend to cause pelvic congestion and on this account are used with caution in pregnancy and when the subject has haemorrhoids or a tendency to them The indications for senna are much the same ... rhubarb and aloes It is often the drug of choice because it is very effec-
... less

contain excess of roughage which adds to the bulk of faeces and stimulates the defaecation reflex The same effect may be achieved by giving other substances

cient supply of food containing vitamin B should always be assured Whether or not a subclinical vitamin B deficiency affects intestinal activity is uncertain Nevertheless individuals who have a tendency to constipation find a mixture of bran and vitamin B complex, as in the form of Bemax, a mild and satisfactory aperient when taken daily before breakfast

FLUIDS

Constipation may be due to drinking too little fluid and in the treatment of constipation an intake of 2½–3 pints daily is advised Very hard water may be consti-

distilled water, was often drunk with the same object Orangeade, lemonade and lime-juice have a slightly laxative effect, beer, stout and cider have a laxative action, wines and spirits vary in their effect on different persons Generally speaking alcoholic drinks are laxative

REST AND EXERCISE

The effect of rest and exercise varies in different subjects For failure of the

spastic colon there may be attacks of contraction of the longitudinal muscles of the transverse colon associated with a further increase of tone of the circular muscles

constipation should be advised rest in bed Rest alone will improve bowel function and it may cure the constipation, especially when the bowel disorder is due to tiredness

LAXATIVES

Sulphur.—This is less often used now than formerly. It is a mild aperient, but it

Phenolphthalein.—This aperient is much used because it does not cause either colic or flatulence. It is prescribed with paraffin oil or in pill form in a dose of ½–2 grains (maximum dose 5 grains). A disadvantage of phenolphthalein, which it shares with paraffin oil, is that unlike rhubarb and aloes it does not empty the lower

colon, sufficient to cause ill-health and yet not giving rise to any sensation of constipation.

Medicinal paraffin.—This oil is much used in spite of the fact that it is said to adsorb fat-soluble vitamins and interfere with their assimilation. It has also been suggested that it may be carcinogenic although, when given in medicinal doses,

is a usual dose. There are many proprietary preparations of paraffin and phenolphthalein, such as Petrolagar (Red Label) and Agarol Compound, which are widely used. The dose of medicinal paraffin is 1–2 teaspoonfuls once or twice a

Enemas

It may be inadvisable for a number of reasons to attempt to empty the bowel by the use of laxatives. Under such circumstances the lower bowel can be emptied by the use of enemas. An enema must be given slowly with precaution not to run in air. The tube is inserted only 2 or 3 inches and the temperature of the fluid is 104° F. and must on no account be more than 105° F. The quantity given according to need is 5–40 ounces, an ordinary enema is 25–30 ounces. When it is impossible to obtain a satisfactory evacuation of the lower bowel with laxatives, and frequent or daily enemas are given for a time, the objective is to give the least irritating solution, namely plain tap water, in the minimum effective quantity which may be as little as 5 or 8 ounces. An *enema simplex* consists of tap water, an *enema saponis* consists
the size of a large walnut thoroughly
ite pain,
olon), it
is due to the fluid having been run in too fast, to the enema being too hot, or to the soap not being completely dissolved. *Enema terebinthinae* consists of a soap enema to each pint of which 1 ounce of turpentine is added. When giving a turpentine enema the skin around the anus is first smeared with Vaseline. An *ox-bile enema*

medical practitioners, but there are several proprietary preparations in general
e of which it forms the effective ingredient

In the prescription of laxatives *the minimum* effective dose is advised If the laxa-
ve suits the patient it may be taken for *years* without any increase of the dose,
provided that the patient is warned not to take too much *It is the excessive dose of*
laxative that leads to the bowel becoming intolerant of it or accustomed to it

Aloes —Aloes is given in the form of extract of aloes in a pill immediately after
the evening meal The dose is generally ¼–1 grain and more may be given The
official maximum is 3 grains but larger doses are tolerated and may be required in,
for instance, cauda equina lesions and hysteria In such cases it is probably better to
combine aloes with phenolphthalein than to give a large dose of aloes alone

Rhubarb —Powdered rhubarb is a better preparation than the tincture or the
infusion It is given in a dose of 3–6 grains immediately after the evening meal, or
in a dose of ¼–1 grain with bicarbonate of soda a quarter of an hour before meals,
3 times a day The disadvantage of rhubarb is *that* it may cause headache and
biliousness but when it suits a patient it is no doubt one of the best laxatives for
regular use

Senna —This is given either as confection of senna or infusion of senna pods
When senna pods *are* used they are put to soak in a tumbler of cold water in the
morning and the infusion is drunk *at* bedtime Infusion of senna is less likely to
have a griping effect when it is made with cold water The ordinary dose of senna
pods is 4–12 pods

Cascara —This drug may be used as a tonic for a sluggish or atonic colon The
dose is 5–15 minims of the liquid extract given 3 times daily For occasional use
60-minim doses may be given and when this dose of the liquid extract is prescribed
it is often best given with an equal quantity of medicinal paraffin oil

Frangula —This is used in the form of an extract of the bark It is an interesting
drug because it may be effective in as small a dose as $\frac{1}{10}$ or $\frac{1}{12}$ grain One proprietary
preparation contains only $\frac{1}{40}$ grain in the prescribed dose

Mercury [illegible] ves act on the small intestine as well as on the colon and the
[illegible] same as for saline cathartics They are given
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good effect daily in congestive heart fa [illegible] sometimes calom [illegible] in succession in each we
They are taken once or twice a week, but sometimes calom
of $\frac{1}{10}$ or $\frac{1}{12}$ grain, 3 or 4 times daily, perhaps for 3 or 4 days in succession in each we

Mild aperients

Castor oil —In *Cushny's Pharmacology and Therapeutics* 1936, castor o
described under the heading of "mild aperients" In practice it is only used
occasional constipation for which it is of great value because it acts both o
small and large intestine Given on an empty stomach it generally acts wi
hours and determines an easy action with the evacuation of a loose stool and
plete emptying of the pelvic colon *It is* therefore of value when it is difficult
nd of small hard residues in the pelvic colon

Sulph r—Th e s le n ft — d

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ontains g grain of precipitated sulphur and 1–4 lozenges may be taken at a time It
s often known as Garrod's lozenge (his formula contained 4 grains of precipitated
ulphur) and it was prescribed for rheumatic subjects

Phenolphthalein—This aperient is much used because it does not cause either
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hares with paraffin oil, is that unlike rhubarb and aloes it does not empty the lower
owel completely It may happen, therefore, in a person who takes phenolphthalein
egularly, that there is what seems to be a satisfactory bowel action every day and
et there may be meanwhile a considerable accumulation of food residues in the
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hthalein, such as Petrolagar (Red Label) and Agarol Compound which are
idely used The dose of medicinal paraffin is 1–2 teaspoonfuls once or twice a
ay, or a teaspoonful taken on alternate days may be sufficient A tablespoonful is
aken regularly once or twice a day by some people without apparent harm In
olerance of paraffin is shown by a leaking of the oil per anum or by flatulence

nemas

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consists of a soap enema to 1 pint of which 1 ounce of purified ox bile is added A more convenient form of enema is glycerin It is given with a glass syringe in a quantity of ¼–½ ounce Both the glycerin and syringe are warmed If a syringe is not available the glycerin can be diluted with an equal quantity of hot water and run in with a tube and funnel

Suppositories

Another method of emptying the lower bowel is by the use of suppositories One (or two) glycerin suppositories are inserted 2 inches into the rectum and retained by voluntary action for 10–15 minutes before the bowel is allowed to empty itself The suppository is inserted more easily if it is first dipped in hot water by which means it provides its own lubricant The *British Pharmacopoeia* suppository contains 70 per cent by weight of glycerin

In severe cases of pelvic colon constipation associated with dry pelvic colon and complicated by sigmoiditis, the early stages of recovery are promoted by running in 4 ounces of medicinal paraffin oil at bedtime, this is retained overnight

SPASTIC CONSTIPATION

Anti spasmodics play a part in the treatment of constipation

Hyoscyamus —Extract of hyoscyamus ⅓–½ grain, is prescribed with the extract of aloes when it is given in pill form, but its value is doubtful because of the delayed action of aloes

Belladonna —Tincture of belladonna, however is effective in the treatment of

saline cathartic A useful combination with magnesium hydroxide is given below, it is taken with water at bedtime, or 3 times a day if required

Mixture of Magnesium Hydroxide (*B P*)	60 min	4 ml
Tincture of belladonna	7½ min	0 47 ml
Peppermint water, to	½ fl oz	15 ml

This type of constipation is aggravated by exercise and improved by rest Whereas, when the subject is up and about he or she may be taking an infusion of 10–20 senna pods or 8–14 grains of cascara sagrada extract every night at bedtime, with rest in bed and means taken to secure a good night's rest, the bowels may act properly within a week or 10 days with quite a small dose of laxative In an individual suffering from constipation due to spastic colon food residues are restricted because they cause flatulence and discomfort and irritate the bowel A low residue diet, however, should be a temporary expedient and when possible the patient should be advised to take an ordinary varied diet

DRY COLON

In some patients who suffer from chronic constipation the trouble seems to be a neurosecretory rather than a neuromuscular disorder On sigmoidoscopy the rectum and distal part of the pelvic colon is seen to have a dry matt surface, quite

distinct from the ordinary glistening surface which is due to the mucous membrane *being covered with the thinnest layer of mucus* For these patients with dry pelvic colon, paraffin oil given alone or in combination with phenolphthalein may be the best laxative because the vegetable purgatives and saline cathartics tend to cause overaction of the bowel and a too loose stool, or in a smaller dose there is no action of the bowel at all

HAEMORRHOIDS

Either paraffin or paraffin combined with a small dose of phenolphthalein is generally the best laxative for haemorrhoids Senna in small doses, such as infusion in cold water of 4–8 pods, may be used Hard stools and straining at stool must be avoided In those who are subject to haemorrhoids a morning evacuation of the bowel *is essential A sufficient fluid intake must be assured Coffee, alcohol, aloes* and rhubarb, and particularly salts, tend to aggravate haemorrhoids These measures, and the use of suppositories, are chiefly of value in moderately slight cases The treatment of the established condition is by injection treatment or by surgery

PREGNANCY

Any aperient should be used with caution in pregnancy as violent bowel action may predispose to either abortion or premature labour if, for any reason, the foetus is more likely than usual to be expelled The best aperients in pregnancy are paraffin or senna in small doses taken separately or in combination

SUMMARY

In the use of laxatives for the treatment of chronic constipation the object is to restore normal function, namely the evacuation of a formed stool with a sense of completion The minimal effective dose should be prescribed and occasional constipation *is preferable to habitual loose stools A combination of drugs may be* more effective than a single drug It is probably for this reason that a number of proprietary saline cathartics are preferred to simple Glauber's or Epsom salts, cascara is often prescribed with paraffin oil In obstinate constipation a combination of aloes and phenolphthalein may be better than either drug given alone Other effective combinations are aloes and rhubarb, as in Pilula Rhei Composita (*B P*), and phenolphthalein and Petrolagar, of which combination there are many proprietary preparations

CONCLUSIONS

In many subjects of constipation a variety of aetiological factors are involved Reference has already been made to some of these The medical practitioner will, however, review the case as a whole and improve health and strength wherever there is an indication of weakness because constipation is so often due to an unfavourable or tired state of the neuromuscular mechanisms of the digestive tract From *this point of view* treatment is prescribed to restore normal function elsewhere The objectives are a good appetite, peaceful sleep, a normal menstrual rhythm and so on Constipation may be a complication of anaemia It is an accompaniment of several disorders of the endocrine system, especially hypothyroidism *and sometimes Addison's disease It* may be an early symptom of congestive heart

consists of a soap enema to 1 pint of which 1 ounce of purified ox bile is added A more convenient form of enema is glycerin It is given with a glass syringe in a quantity of ¼–½ ounce Both the glycerin and syringe are warmed If a syringe is not available the glycerin can be diluted with an equal quantity of hot water and run in with a tube and funnel

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Belladonna—Tincture of belladonna, however is effective in the treatment of spastic constipation It is given in a dose of 5–10 minims 3, or at most 4, times a day The vegetable laxatives of the anthracene series which irritate the large intestine, are liable to cause colic in spastic constipation, and even in large doses they may be completely ineffective Belladonna is therefore, combined with a saline cathartic A useful combination with magnesium hydroxide is given below, it is taken with water at bedtime, or 3 times a day if required

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DRY COLON

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TREATMENT

Medical treatment is sufficient in many cases and is th elderly, fragile subjects

Diet

The treatment should aim at avoiding overloading of the st ing intra abdominal pressure and minimizing regurgitation i The essentials are light diet with frequent small feeds rather th particularly avoidance of a big evening meal A reducing diet patients

Posture

Patients should not lie down soon after meals, elderly patients during the day should lie down before meals Bending and sto avoided and the bowels should be assisted if there is straining The sleep well propped up, with the head of the bed slightly raised

Medicinal treatment

A small dose of sodium bicarbonate last thing at night may pre discomfort from heartburn

Surgical treatment

With large hernias, causing mechanical difficulties, a surgical repa but a phrenic crush may be of palliative value

TREATMENT OF COMPLICATION OF PEPTIC ULCERATION OF THE OESOPHAG

If there is associated peptic ulceration of the oesophagus, rest in bed, we up, with an ulcer diet régime is needed Duodenal feeding or jejunostom necessary The rational treatment is to cure the deformity which allow reach the oesophagus and, particularly in a younger patient, surgical repa be considered even if there is obvious shortening of the oesophagus With scarring dilatation of the oesophagus under direct vision with bougies is ne

F AVERY J

DIARRHOEA, CHRONIC

INTRODUCTION

The term diarrhoea indicates the evacuation of loose or liquid faeces, the co tion is generally accompanied by increased frequency of defaecation Accu diagnosis is the keystone to the management of chronic diarrhoea The patie stools need to be seen because too frequent defaecation of normal or semiso stools may be mistaken by the patient for diarrhoea A more serious mistake made by the patient when he uses the word diarrhoea to describe the freque evacuation of mucus, or blood and mucus Actual inspection of the stools may giv a clear indication as to the diagnosis of the disease

failure, cirrhosis of the liver and cerebral tumour In fact so varied is the aetiology of constipation that a complete examination of the patient needs to be made Any patient with chronic constipation that does not respond to simple remedies should

diagnosis of the location and type of constipation

GEOFFREY EVANS

University Press

DIAPHRAGMATIC HERNIA

Herniation of the abdominal contents occurs mainly through the oesophageal hiatus, but may occur elsewhere through the diaphragm Symptoms may arise either from impairment of function of the herniated viscera or from pressure on the intrathoracic structures Post prandial distress, intermittent subacute obstruction, dyspnoea, cough and palpitation may thus all arise, and the protean manifestations may cause considerable diagnostic difficulties Diaphragmatic hernia is primarily a mechanical problem and the only curative treatment is operative repair of the abnormal openings in the diaphragm Many cases respond to simple medical procedures, and surgical treatment is indicated only in the presence of disabling symptoms

OESOPHAGEAL HIATAL HERNIA

Symptoms

Oesophageal hiatal hernia should be suspected in (1) under-developed children, particularly if they have a "small swallow", (2) patients with a sense of fullness or epigastric distress at or under the tip of the xiphoid, occurring after the first few

angina, worse after meals, aggravated by lying down and by emotional stress, (5) patients with unexplained haematemesis or melaena, (6) patients with unexplained anaemia, and (7) patients with unexplained paroxysmal cough, palpitations or dyspnoea

The exact symptoms will depend on the size of the hernia and on the presence or absence of associated peptic ulcer of the oesophagus

The demonstration of a hiatal hernia requires special technique by the radiologist and may easily be missed with routine examination unless attention is particularly focused on this region

A pitfall in diagnosis is the finding of a hernia in a patient who is developing increasing intra-abdominal tension as the result of an unrecognized pelvic tumour

FAILURE OF FAT ASSIMILATION AND STARCH DIGESTION

Any disorder of the small intestine may be the cause of diarrhoea Faulty digestion of fat in the small intestine (fatty diarrhoea), whatever the cause, or of starch (intestinal carbohydrate dyspepsia) is a well known cause of diarrhoea Whether this failure, in the case of fat for example, is due to some disease, such as sprue, tropical or non tropical, or pancreatic disease, or is due simply to the hurried passage of food residues through the small intestine as a result, for instance, of a daily laxative, the excess of fat on reaching the colon increases its peristaltic activity and causes diarrhoea, flatulence and, on occasion, colic

ORGANIC DISEASE OF THE INTESTINES

Any kind of organic disease of the small intestine, including an annular stricture or other cause of obstruction, is a cause of diarrhoea Under this heading are included tuberculosis, regional ileitis, amyloidosis, lymphadenoma, sarcoma and carcinoma The common organic diseases of the large intestine characterized by diarrhoea are especially the several forms of colitis, specific and non specific, and on occasion diverticulitis and polyposis, and carcinoma more especially when it is in the proximal colon Carcinoma of the distal colon more often causes constipation, or alternating constipation and diarrhoea Not only faecal impaction in the lower bowel, but also incomplete evacuation of the pelvic colon may set up a local irritation or sigmoiditis This type of diarrhoea due to constipation is known as spurious diarrhoea and it is most important to distinguish it from true diarrhoea

TOXIC CAUSES

The commonest exogenous intestinal irritant is the habitual use, or abuse, of laxatives Some individuals take laxatives so regularly and are so accustomed to loose stools even amounting to diarrhoea, that, unless special inquiry is made as to the character of the stools, the fact of habitual loose stools may escape notice Some individuals have diarrhoea as a result of taking too much alcohol Others, who become hypersensitive to alcohol, may have diarrhoea as a result of taking only a moderate quantity Diarrhoea, when caused by alcohol, is evidence of its being taken in excess whatever the quantity taken Arsenic and, rarely, iron may cause chronic diarrhoea

Common examples of endogenous irritants are thyrotoxaemia, uraemia and septicaemia Chronic infections such as pulmonary tuberculosis, wasting diseases and cachetic states may be accompanied by diarrhoea

TREATMENT

The effective treatment of diarrhoea is based on the diagnosis of its location and

scopy are generally required and should always be carried out when response to treatment is inadequate

GENERAL

Rest in bed and warmth are essential in the treatment of chronic diarrhoea The patient should remain in bed until the diarrhoea is under control If the diarrhoea

PHYSIOLOGY

A knowledge of the physiology of bowel movements is a help to the understanding of the varied aetiology of diarrhoea Peristaltic waves travel in an aboral direction It is only in certain parts of the intestine that anti peristaltic waves occur, but neither these nor the segmenting movements of the small intestine concern the present consideration of diarrhoea Normal peristalsis consists of a slow, gentle

and then pass on to the ascending and transverse colon as a result of gentle peristaltic waves, pendulum movements, and, according to Alvarez (1919, 1940), a gradient of metabolic rate, neuromuscular tone and peristaltic activity extending downwards from the duodenum to the pelvic colon

Peristaltic activity is determined by a wide range of factors One of these is the gastro-colic reflex, which is a mass movement of the contents of the colon, comparable to the peristaltic rush in the small intestine referred to above This movement normally occurs about 2 or 3 times in 24 hours and it is commonly started by the entrance of food into the stomach

AETIOLOGY

Nervous Diarrhoea

Peristaltic activity varies in different persons It is reasonable to suppose that Alvarez's gradient is sometimes steeper than normal, or that the gastro-colic reflex is unusually sensitive There are some individuals in whom it is almost a habit to pass loose stools Such an individual may be perfectly healthy and defaecation may be at a regular time after breakfast and only once daily In others any slight emotional strain, such as having to catch a train, may cause a loose action of the bowels In other persons an emotional disturbance, pleasurable or otherwise, may be the cause Diarrhoea, in fact, is a common psychosomatic symptom and may represent the visceral response to passing or sustained environmental difficulties, either emotional or physical

Failure of Gastric Function

A variety of physical stimuli increase peristaltic activity Food that is badly mastica
when
hydria
follow atrophic changes in the gastric mucosa On the same basis is explained the association of chronic diarrhoea with carcinoma of the stomach, and it may be a troublesome symptom after operations on the stomach, namely gastro-enteros-
tomy

probably starch cooked with fat, and fried fat, such as pastry, batter, suet and cake, fried, sauté and roast potatoes fried bacon, and cooked cheese As the diet is increased in variety, when normal bowel function has been re established, fat in these forms is the last to be added to the diet The diet for a patient with diarrhoea is built up on the basis of arrowroot, toast, rusks, bread, plain biscuits, skimmed milk, junket, blancmange With recovery milk puddings may be added, and then fish, chicken, tender meat, mashed or boiled potatoes, sieved greens and root vegetable *purée* With this diet a patient may take a little butter and margarine, but other fats are excluded until the stools are normal or nearly so

Fluids

In the severest cases water, arrowroot, barley water and glucose only are given by mouth With recovery, tea and other drinks may be taken warm but not hot or very cold Meat soups and alcohol are prohibited The teetotal régime may have to be continued, especially when there is a past history of dysentery, for a year or more, or the patient may take alcohol occasionally and may have a little return of loose stools which does not matter provided that it is transitory

MEDICINAL

The simplest medicinal treatment is with bismuth or kaolin Bismuth salicylate 30 grains (2 grammes) is given in powder form 3 or 4 times a day Kaolin (Kaolinum leve, *B P*) is given in powder or colloidal form, 2–8 drachms 4-hourly [illegible]

is a safe and useful preparation The dose is 5–10 minims (0 3–0 6 millilitre) Ten minims contain $\frac{1}{48}$ grain morphine hydrochloride Tinctura Chloroformi et Morphinae Composita (*B P C*), however, contains $\frac{1}{11}$ grain morphine hydrochloride in 10 minims

TREATMENT OF COMPLICATIONS

DEHYDRATION

Fluid shortage must be made good by the administration of additional fluid given by mouth When diarrhoea is severe, even large quantities of fluid by mouth may not be sufficient to make good the fluid shortage Under these circumstances and when fluid given by the rectum is not retained it is best given intravenously in the form of glucose saline solution The objective is to maintain the excretion of urine at 800–1,200 millilitres daily

Diarrhoea is a potent cause of salt depletion, for the treatment of which *see* page 532

MALNUTRITION

Malnutrition may show itself in the form of hypovitaminosis and, according to the condition of the patient, 2–4 times the ordinary daily vitamin requirement is given The major deficiency is likely to be in respect of water soluble vitamins The suggested daily dose of the several vitamins (given according to the condition

is of long standing the patient should remain in bed for 2 or 3 weeks after bowel function is restored to normal, in order that the new (normal) habit of bowel

nal paraffin, or a teaspoonful of Mistura Magnesii Hydroxide (*B P.*), is generally a safe laxative to prescribe, or liquid extract of cascara, 5–10 minims twice or 3 times daily, may be given If these mild laxatives are ineffective it is better at first to give a plain warm water enema of 10–20 ounces, as required, to empty the lower bowel, rather than to give a stronger laxative

Personal conversation with especial inquiry as to the emotional and physical environment at the time of the onset of the diarrhoea, together with inquiry as to any persistent emotional or physical strains, followed by explanation of possible sequences of cause and effect and always ending with assurance and encouragement, is an important part of the treatment in most cases of chronic diarrhoea.

Even when the initial cause is psychogenic the persistence of diarrhoea as well as the patient's emotional state may be due to other causes Chronic diarrhoea itself has a debilitating effect, both physically and emotionally, and the personality traits exhibited by the patient suffering from chronic diarrhoea may be partly due to the disability itself. This is especially evident in severe cases in which chronic diarrhoea leads to hypovitaminosis, even to syndromes approximating to pellagra and beri-beri. Not only may there be physical symptoms of these disorders such as cheilosis, glossitis and stomatitis, but also nervous irritability, depression, anxiety and psychosis It is important, therefore, to realize that the psychological aspect of the case may sometimes be restored to normal by simply restoring normal bowel function

Further, the functional disturbance, whether initiated centrally as a result of, for instance, emotional exhaustion or endo-psychic conflict, or initiated peripherally as a result of dysentery, may persist as a bowel habit, perhaps to be interpreted in terms of a conditioned reflex This matter of organ habit is most important in health and disease, and in regard to both good and bad habits It is common knowledge that constipation may be nothing more than an acquired habit of the defaecating mechanism of the bowel, but it is not so generally appreciated that this is sometimes the explanation of chronic diarrhoea Whereas, therefore, as has already been said, the first line in treatment must be on an aetiological basis, nevertheless a patient may be cured, and permanently cured, by adequate symptomatic treatment if the original cause is no longer operative.

DIETETIC

be skimmed, eggs, cheese and meat fat are withheld The most indigestible fat is

The only satisfactory treatment is excision Before and immediately after the operation, the patient should be fed through a catheter previously introduced over a string swallowed when the sac is empty

A diverticulum may occasionally be found at the lower end of the oesophagus, but this is of no clinical significance

STOMACH

A diverticulum may form from the posterior wall, just below the cardiac orifice, and it may simulate a large gastric ulcer These diverticula seldom cause trouble some symptoms and may be discovered together with another lesion such as an ulcer or a carcinoma, which really led to the radiological examination Postural drainage after meals may be advised, but surgery is very rarely needed

SMALL INTESTINE

Diverticula are commonly found in the duodenum and may be observed in about 2 per cent of patients who have barium meal examinations The majority develop in the second part of the duodenum and project from the inner or pancreatic border, but they may also develop in the third part of the duodenum These are all primary diverticula, unlike the pre stenotic diverticula associated with duodenal ulcer in the first part of the duodenum

Although many are symptomless, some patients complain of a long history of epigastric discomfort ½–3 hours after food without remissions

Treatment is essentially medical, it consists in a light diet and belladonna to overcome any associated duodenal spasm Postural drainage may be of value, and adoption of the knee–chest position may assist in evacuating the contents of the sac Operative removal of duodenal diverticula is hazardous

Jejunum and ileum

The jejunum and ileum are the least common sites for diverticula to develop in the alimentary canal The majority are formed in the mesenteric border in the upper part of the jejunum They may cause vague abdominal pain occurring at an interval after meals Medical treatment does not provide any relief and operation may be indicated if the symptoms are troublesome Unlike duodenal diverticula, they do not present any serious technical difficulty to the surgeon

Meckel s diverticulum (a remnant of the vitelline duct) is a congenital pouching of the ileum Aberrant gastric mucosa may be found in the pouch and a peptic ulcer may form at the edge of the pouch and may cause intestinal bleeding This condition must be suspected in patients who have had recurrent symptomless melaena and a laparotomy should be performed Perforation or intestinal obstruc tion are other serious complications and they are surgical emergencies

COLON

Diverticula of the colon are nearly always multiple They are most often found in the pelvic colon and are most numerous there The diverticula may be sparsely scattered throughout the length of the colon Their association on occasion with diverticula in the ileum or elsewhere in the digestive tract is evidence of their con genital origin in some cases This condition is known as diverticulosis

of the patient) is as follows ascorbic acid, 200 milligrams daily (50-milligram tablets), thiamine hydrochloride, 10–30 milligrams, nicotinamide, 150–300 milligrams (50 milligram tablets), riboflavine, 6–12 milligrams, vitamin A, 25,000–50 000 i u, vitamin D, 4,000–8 000 i u (Adexolin capsules contain vitamin A, 6,000 i u, and vitamin D, 1,000 i u, Radiostoleum capsules each contain vitamin A, 6 000 i u,

[illegible]

treated with a high-calorie diet which also is prescribed when the bowels are able to assimilate it Iron is prescribed for anaemia, namely ferrous sulphate tablets, 3 grains, 3 times daily after meals Some patients cannot tolerate iron on account of its increasing the diarrhoea When there is marked anaemia, blood transfusion with 1 or 2 pints of whole blood is beneficial

Tenesmus

Tenesmus is best treated with a starch and opium enema This consists of 2 ounces of thin starch which is warmed, and a little of it is poured into the funnel of the enema apparatus As soon as the starch begins to run into the rectum 20–30 minims of tincture of opium are added and when this has run in the rest of the starch solution is poured into the funnel

Colic

Colic is treated with tincture of belladonna, 5–7½ minims by mouth 4-hourly To this may be added codeine phosphate in the dose already stated and perhaps also tincture of stramonium, 5 minims (0 3 millilitre)

Other Complications

For nervous irritability, restlessness and insomnia Syrupus Chloral (*B P C*) 30–60 minims (5–10 grains of chloral hydrate) may be given 2 or 3 times daily, and at night a mixture of sodium bromide, 15 grains Syrupus Chloral (*B P C*) 60–90 minims, and peppermint water to ½ ounce may be given with water at bedtime alternatively, phenobarbitone may be used in a dosage of ¼–½ grain twice or 3 times daily, and ½–1 grain at bedtime

GEOFFREY EVANS

Alvarez, W C. (1919) *J Amer med Ass*, 73 1438
— (1940) *Introduction to Gastro-Enterology*, 3rd ed, London Heinemann

DIVERTICULOSIS AND DIVERTICULITIS

Diverticula may develop in the pharynx, oesophagus, stomach, and in the small and large intestine

Pharynx and Oesophagus

The common type, or pharyngocele, forms as a pouch on the posterior wall of the pharynx, just above the inferior constrictor muscle The pouch, which may measure as much as 5 inches in depth, extends over to one side and may pass down into the mediastinum

TREATMENT

The treatment of diverticulitis is with rest in bed and the application of heat to the affected part—commonly in the left iliac fossa, due to diverticulitis of the iliac or pelvic colon.

Diet

In a moderate case a low-residue diet is advised, namely, sugar, treacle or golden syrup, fruit jellies and honey, butter, margarine, olive oil and eggs, restricted quantities of t
leave very litt
avoided Fluic
water, fruit drinks and weak tea with milk and sugar, but no alcohol Milk is restricted to ½ pint daily because it may cause bulky faeces and constipation In severe cases for a few days the patient should take no solid food, intake being confined to gl cose, cane s gar, barley-water and d lute fruit drinks as a vehicle

Medicinal treatment

ma in the morning Tincture of bella-
times daily to relieve spasm and pain
gramme, 4 tablets, 6-4 hourly (8-12 grammes) in 24 hours, should be given to reduce the intestinal flora In addition a full course of penicillin is given

Surgery

When the patient suffers from recurrent attacks of diverticulitis and if the diverticula are localized, removal of the affected length of the colon may be a successful operation provided that it is technically possible The involvement of the bladder wall in the pericolitis, and narrowing of the bowel lumen in the inflamed area, are indications for partial colectomy In severe cases in which medical treatment fails and removal of the diseased bowel is inadvisable or impracticable, a temporary *colostomy may be performed*

Maingot, R. (1948) *Abdominal Operations* New York, Appleton Century-Crofts

F AVERY JONES
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DYSPEPSIA

INTRODUCTION

The term dyspepsia applies to disorders of gastric function for which no organic disease in the stomach is accountable Before making the diagnosis of dyspepsia,

DIVERTICULOSIS

Diverticulosis indicates the presence of small pouches of mucosa which herniate through the muscle layer of the colon It is a common condition, particularly in patients over 40 years of age Constipation and straining at stool as well as habitual loose stools, whether due to the abuse of laxatives or other causes, are believed to be aggravating or determining factors both in the production of diverticulosis and in predisposing to diverticulitis The first line in preventive treatment, therefore, is to secure normal bowel function (*see* Constipation, page 698)

TREATMENT

General management

If diverticulosis is symptomless and is discovered accidentally in the course of a routine radiological examination of the digestive tract, it is best to tell the patient that he has a few little pouches in the wall of his bowel, because he requires to avoid constipation and straining at stool The patient is advised to keep his stools soft by taking one or two teaspoonfuls of medicinal paraffin daily, or a vegetable mucilage such as I so gel If the patient requires a regular laxative the dose must be regulated so as to avoid habitual loose stools Diverticulosis is often symptomless and, over a period of 20 years or more, it may give rise to no trouble or inconvenience The patient should be advised that the pouches are of little account and that all he needs is to regulate his bowels on the lines indicated above

There is no real evidence to prove that carcinoma develops on diverticulitis (Maingot, 1948), and the patient should be firmly assured of this if he has any thought of carcinoma

Dental care

If the masticating surface is inadequate it must be made good The patient is advised to chew his food well, especially fruit and vegetables Gross dental sepsis should be eliminated because it may be an aetiological factor

Diet

If, on the other hand, there are symptoms of disturbed bowel function, such as intestinal flatulence, slight localized abdominal discomfort often felt in the left iliac fossa, occasional colicky pain or irregular action of the bowels, then a low-residue diet is advised The skin and pips of fruit are avoided, root vegetables are *purée* and green leaf vegetables are sieved If vegetables are young and tender these extra precautions may be unnecessary Raw vegetables and salads are avoided

DIVERTICULITIS

In a small proportion of subjects with diverticulosis one or more of the diverticula become inflamed and diverticulitis results Diverticulitis may be due to thickening of the neck of the diverticulum by oedema from stagnation of the contents, causing mucosal ulceration The inflammation tends to spread through the wall of the bowel and cause peritonitis With recovery, thickening of the bowel wall may result and lead to some degree of obstruction of the lumen, in other cases the inflammation leads to local abscess formation, or it may lead to fistulae into adjacent intestine or into the urinary bladder In an acute case perforation may occur, causing general peritonitis

chewed Dyspeptics are inclined to restrict the variety of their food Care should be taken in adding to these restrictions, nevertheless personal idiosyncrasies are recognized, obviously indigestible food is avoided, pickles, curries and condiments are prohibited Generally speaking the more indigestible fats are prohibited namely, chocolate, pancakes, cooked cheese, suet, starch cooked with fat and fried food Alcohol is generally prohibited, as is strong tea and coffee, and very hot drinks

Teeth

Material dental sepsis should be eradicated and a good masticating surface provided if teeth are defective

Bowels

Bowel function should be regulated

Medicinal Treatment

To improve appetite a rhubarb and soda mixture may be given 15 minutes before food The following is a suitable prescription

Powdered rhubarb	½–1 gr	0 03-0 06 g
Sodium bicarbonate	10-15 gr	0 6-1 g
Syrup of ginger	10-15 min	0 6-1 ml
Compound infusion of gentian, to	½ fl oz	15 ml

For heartburn and discomfort after meals, an alkaline powder or a bismuth and soda mixture such as the following, may be taken ½ hour after food

Bismuth carbonate	15 gr	1 g
Sodium bicarbonate	10 gr	0 6 g
Heavy magnesium carbonate	5 gr	0 3 g
Mucilage	as necessary	
Chloroform water, to	½ fl oz	15 ml

If there is nervous (emotional) tension or unrest, sodium bromide 5–10 grains may be added to the above mixture Alternatively phenobarbitone, ¼–½ grain, taken before food twice or three times daily, may be effective Lastly, an acid mixture taken immediately before or with food may be prescribed as follows

Dilute hydrochloric acid	15–20 min	1–1 2 ml
Glycerin of pepsin	60 min	4 ml
Syrup of orange	15 min	1 ml
Chloroform water, to	½ fl oz	15 ml

All these medicines are taken with water and they are not persevered with unless they give symptomatic improvement obviously and quickly While every effort is made to discover the cause of dyspepsia and to deal with it, symptomatic treatment

nation should be made and repeated from time to time

gastritis, peptic ulcer, carcinoma and pyloric stenosis must be excluded Di
matic hernia, though not an organic disease of the stomach, belongs to th
order of events Aerophagy and cascade stomach are functional disorders
stomach, but they are clinically distinct syndromes and their treatment i
cussed elsewhere.

AETIOLOGY

Having excluded organic gastric causes of dyspepsia, there are three aetiologi
groups to be considered First, the gastric unrest may be due to stress, physic
mental or gastro-intestinal, physical from fatigue or insomnia, nervous stress fro
anxiety, resentment or frustration Gastro-duodenal irritability may be due t
irregular meals, to eating quickly or to taking badly cooked food Habitual purga-
tion for constipation may cause function disturbance producing indigestion
Secondly, the dyspepsia may be associated with organic disease elsewhere in the
digestive tract, particularly gall bladder or liver disease, or disease elsewhere in the
body It is a common complication of congestive heart disease and pulmonary
tuberculosis Thirdly, indigestion may be associated with functional states affecting
the body, for example, pregnancy, constipation and psychoneuroses

SYMPTOMATOLOGY

The symptoms of gastric dyspepsia are epigastric or substernal discomfort or
pain, a sense of fullness in the upper abdomen, heartburn, water brash, flatulence
and belching, and regurgitation of food or acid fluid

TREATMENT

General

The general treatment of a patient with gastric dyspepsia is similar to that
prescribed for enterospasm (*see* Visceral Neurosis, page 721) An explanation to the
patient of the effect on gastric function of emotional fatigue and strain is an import-
nt part of the treatment If the patient is given time to discuss his problems, as
ell as an attentive and understanding listener, much that is disturbing him may
revealed Simple questions that are unanswered may suggest a deeper underlying
turbance that should be disclosed Unnatural secretiveness and unexplained
agonism are among the symptoms of mental derangement It is important that
medical practitioner should recognize the limitations of rational thinking in
atients (and in himself too, for that matter) because time is ill spent in appeal-
reason in individuals whose thoughts are swamped with feeling, just as it is
se who are irrational In these patients a diversion of feeling to a right direc-
ay be needed, and it may be required of the medical practitioner to find for
ent something to love or a devil to hate This "sensational" approach is the
ve to the rational approach, and it may be helpful when the mere ventila-
fear or grievance, for example, is not enough to give the individual peace

ent is advised to eat small meals at 3-hourly intervals The diet should
the meals punctual and unhurried, the food easily digestible and well

of benzocaine, 3 grains in one dessertspoonful of medicinal paraffin oil A dessert-spoonful is given 5–10 minutes before meals

ACHALASIA (CARDIOSPASM)

In this rare condition there is a disturbance of normal peristaltic activity of the oesophagus with a failure of relaxation of the cardia Food and fluid accumulate in the dilated oesophagus and a hydrostatic pressure of 7 inches is needed to force the contents into the stomach Tremendous dilatation of the oesophagus may develop with sigmoid elongation In some cases, the disorder may be psychogenic Although the established case cannot be cured by psychiatric methods, improvement may follow the discovery and management of psychological difficulties

TREATMENT

There are at least four lines of treatment available Octyl nitrite has been shown

lasts about 7–10 days and is at present produced by British Drug Houses The second line of treatment is the use of a mercury bougie The bougies are made of rubber tubes closed at the top and partly filled with mercury The smallest is 24 gauge and the largest 34 gauge Increasing sizes are passed, and then the largest size possible, preferably the 34 gauge, should be passed before each meal With great dilatation of the oesophagus, the sigmoid elongation may prevent the use of a bougie The third method of treatment is the use of the Negus hydrostatic dilator which dilates the cardia and may cause prolonged relief An oesophagoscope is passed under local anaesthesia, and the cardia is identified and dilated with gum elastic bougies up to size 30 The stilette of the dilator is passed through the cardia and the Negus hydrostatic dilator is inserted over the stilette, making certain that the constricted part of the oesophagus is in the centre of the Negus bag as otherwise it may slip up or down without distending the ring of the cardia It is usually advisable to inflate the bag with 20–40 millilitres of water at three different levels (Wooler, 1948) The dilatation is repeated twice at fortnightly intervals Finally, surgical measures may be needed Dilatation of the cardia may be performed

or a direct anastomosis of the oesophagus and stomach may be performed (oesophago-gastrostomy), but this has few advocates today

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Wooler, G H (1948) *Thorax*, **3**, 53

ENTEROSPASM

Irritability of the gastro-intestinal tract with hyper-motility or spasm, may present itself in many forms including gastric dyspepsia, flatulence, intermittent abdominal pain, nervous diarrhoea and constipation The clinical labels attached

DYSPHAGIA

Dysphagia may be an emergency due to the swallowing of a foreign body
a fish bone The foreign body should be removed at once under direc
through an oesophagoscope Delay is dangerous in view of the risk of m
nitis Penicillin should be given, but any drugs which may produce nause
vomiting should be avoided

When dysphagia is a presenting symptom with gradual onset, it should be
investigated A careful history and examination—including a complete examin
of the nervous system, of the stools for occult blood, a blood count, a bar
swallow and barium meal, x ray of the chest and oesophagoscopy—are usu
required The common causes of dysphagia as a presenting symptom inclu
iron-deficiency anaemia with the Plummer-Vinson syndrome, achalasia of t
cardia, carcinoma of the oesophagus or of the fundus of the stomach, pept
oesophagitis or ulceration, stricture and pharyngocele

Dysphagia may be part of the clinical picture presented by a variety of condition
such as acute tonsillitis, mumps diphtheria bulbar palsy and myasthenia gravis For
dysphagia associated with pain, an aspirin gargle is of value For the dysphagia asso-
ciated with impaired neuromuscular control, a semi solid diet is essential as fluids
require too quick a swallowing mechanism and solids too strong a muscular effort.

PLUMMER VINSON (OR PATTERSON KELLY) SYNDROME

In this syndrome, dysphagia is associated with an iron-deficiency anaemia
Persistent folds or "webs" of mucosa form in the upper part of the oesophagus
They disappear with recovery of the anaemia which usually responds well to iron,
this is best given in a fluid form, for example iron and ammonium citrate, 30
grains thrice daily The dysphagia usually improves gradually with recovery from
the anaemia but a prompt response may sometimes be obtained by giving ribo-
flavine, 10 milligrams daily

CARCINOMA OF THE OESOPHAGUS

Surgical treatment is feasible for growths below the arch of the aorta but the
technical difficulties are considerable Palliative treatment may be given by deep
x ray therapy or by increasing the oesophageal lumen by diathermy cautery or by
he use of a Souttar s tube Alternatively, a gastrostomy may be performed, but it
nay not add appreciably to the duration of life.

MPLE STRICTURE OF THE OESOPHAGUS

tricture of the oesophagus may follow peptic oesophagitis peptic ulcer of the
phagus or corrosive poisoning The treatment of the stricture is by dilatation
a bougie When ulceration is present, dilatation should not be undertaken
the ulceration is healed, but it should be carried out as soon as possible after
g has occurred in order to forestall the development of dense fibrous tissue
rst stage of dilatation by bougie should be done through an oesophagoscope
direct vision
e stage of oesophagitis or active ulceration as, for instance, in the case of a
lcer of the oesophagus, swallowing is made easier by sipping a suspension

to these conditions may be nervous dyspepsia, enterospasm, colo
diarrhoea, mucous colitis and chronic appendicitis. There is a conce
the whole group. They are visceral manifestations of emotional str
logical difficulties, and many of the same personality traits are to be f
individuals as in those who suffer with peptic ulceration and the
Generally speaking, such individuals are scrupulous and over-consc
are inclined to "worry inwardly," as a result of which they become "
their emotions find an outlet only through the autonomic nervous syste

TREATMENT

The tolerant and sympathetic hearing of the patient's story is the first
Not only the medical history but the environmental difficulties and disha
should be elicited. This needs an unhurried interview and cannot be done i
surgery or out patient department. The medical practitioner will save much
the long run if he arranges a special appointment for such patients early
management of the case. The treatment of visceral neurosis is essential
management of the individual. The psychological approach is described else
(see Psycho-somatic States, page 1078). It may be advisable, however, to summ
the outline of treatment which the authors employ in the treatment of these dise

Examination

The most detailed physical investigation is essential in all cases of any mont
in order to confirm the fact that the patient is not suffering from cancer or oth
organic disease. The persistence and severity of the symptoms which these patient
suffer has generally created a fear of carcinoma and although they will not recover
complete confidence until they are better, a large measure of assurance and con-
siderable relief from fear can be given them by a detailed examination.

This examination should be extended in order to establish the condition of their general health. In addition to a careful clinical examination there should be a complete blood count, and perhaps an estimation of the basal metabolic rate, x ray examination of teeth and sinuses and so on. Any defects disclosed by these special examinations, as for instance, anaemia, are corrected seriatim, meanwhile the treatment of the patient's general condition is carried out. During the course of the general treatment all side-complaints are investigated, back-ache may be due to low grade lumbar osteoarthritis, headache due to cervical fibrositis, or brachial neuralgia may be due to frozen shoulder. Such additional complaints may be an advantage in providing an opportunity for bringing the patient under the influence of an understanding physiotherapist who has a sanguine outlook. There are two important aspects of diagnosis in the management of this group. First, however strong the functional overlay and however weak the evidence for organic disease, it is advantageous to provide an "organic" diagnosis for at least some of the symptoms. Arthritis or fibrositis are terms understood and appreciated by the patient's friends, but visceral neurosis or enterospasm will evoke no sympathetic response. Secondly, the finding of a strong psychological disturbance must not be allowed to direct attention from possible associated organic disease. Pain, as distinct from discomfort, is seldom due to a purely psychological mechanism; the longer the history the greater the probability of an underlying

Symptomatic Treatment

This may seem to be but a palliative, taking no account of the cause of the disease and only dealing with its expression, but now that it is known that the vagus nerve has cortical representation in the frontal lobes (White and Smithwick 1942) it is

new importance Reference has already been made to the need for a good night's rest Such steps as are possible should be taken to improve appetite and digestion and to secure a normal action of the bowels This aspect of treatment is both the first and the last step in the management of patients who suffer from visceral neurosis The medical practitioner should not be impatient to find a remedy to relieve the patient's symptoms all at once The symptoms, as already explained, are an expression of the patient's personality in its difficulty in adjusting to its

are prescribed, as, for instance, phenobarbitone, ¼–½ grain, or Amytal, ½ grain, taken before breakfast and supper daily

Psychological Treatment

Treatment on the lines described above is based in part on the theorem that the attitude of the body affects the attitude of the mind, or instead of attitude the words "functional efficiency' might be used It is also based in part on an effort to improve the patient's morale by the inculcation of disciplines of thought and mind These disciplines may include repression and this may be of the greatest value in the rehabilitation of a firm and independent character In some cases, however, the illness is too severe and some measure of analysis, or other expert psychological treatment under the care of a psychiatrist, is required

CONTRIBUTORY FACTORS

Diet

page 710) In the early stages of treatment some restriction of cellulose-containing foods is generally advisable, fruit and vegetables may be withheld, fruit juices alone being given When vegetables are eaten, the patient should be given sieved leaf vegetables or a *purée* of root vegetables The skins of fruits, whether as such or in jam, are avoided As soon as possible these patients are returned to a normal diet

medical adviser is needed to clear their conscience and enable them to obtain adequate respite.

Fresh sense impressions

Constantly present or recurring symptoms and continual difficulties create an

Personal influence

Friends need to be carefully chosen because conversation is fatiguing and

themselves a higher standard than they can reach, others have failed through no fault of their own All are benefited by encouragement and explanation.

Thought control

Effect of the body on the mind

Lastly, there is the method of affecting the individual's state of mind by modification of the sensory impulses from his body which reach his brain. A man's

dence in himself is strengthened and it is remarkable that rheumatic pains in the head and neck, which often add to the discomforts of these patients, may be relieved more effectively by teaching the patient how to hold his head on his neck and his neck on his trunk than by physiotherapeutic or medicinal treatment. Modification of sensory impulses may assist in a further way It is not sufficiently realized that the muscular responses to emotional states, both visceral and skeletal, may lead to muscle fatigue and pain The facies of anxiety, with the furrowed forehead and tensed neck, may cause muscular pain, that is, headache, from fatigue of the frontalis and occipitalis muscles and from tension in the epicranial aponeurosis.

muscles in turn Breathing exercises may be of value, by improving the portal circulation and the tone of the muscles of the abdominal wall. Breathing exercises provide another example of the sedative value of rhythmical movement.

x ray examination the healthy small intestine does not show any gas *but a little is* generally seen in some part of the large intestine

GASTRIC FLATULENCE

or obstruction or secondarily due to reflex causes such as disease of the gall bladder or to intestinal d sorder or disease especially an accumulation of gas in

TREATMENT

stomach An irritable stomach *is treated with* bismuth bicarbonate of soda and

daily 15 minutes before meals

Powdered rhubarb	½–1 gr	30–60 mg
Sodium bicarbonate	15 gr	1 g
Syrup of ginger	15 min	1 ml
Compound infusion of gentian to	½ fl oz	15 ml

Alternatively a tablespoonful of an acid mixture with a small dose of strychnine may be given in water 3 times daily after meals

Dilute hydrochloric acid	20 min	1 2 ml
Solution of strychnine hydrochloride	2 min	0 12 ml
Glycerin of pepsin	60 min.	4 ml
Syrup of orange	30 min	2 ml
Chloroform water to	½ fl oz	15 ml

This treatment may be combined with a mild tonic for the intestinal tract such as a dinner pill containing a small dose of aloes A purely symptomatic remedy is bicarbonate of soda and syrup of ginger a teaspoonful of each in a small glass of hot water taken in sips alternatively bicarbonate of soda may be given alone or with peppermint water

Although gastric flatulence is not an important symptom of organic disease of the stomach nevertheless in any case that does not respond to simple remedies a

Allergy

Allergy is another factor of which full account must be taken and any foods known to cause digestive disorder should be avoided A careful history is the best means of identifying these foods

Alcohol

Alcohol should be withheld altogether, both because it may be a gastric or intestinal irritant in susceptible persons and also because a teetotal regimen gives the patient who is accustomed to drink alcohol an opportunity both of cooperating in his treatment and of exercising self-discipline Another disadvantage of alcohol is its sedative effect which may lead the individual to postpone decisions and avoid facing up to things as they are

[illegible] this [illegible] are likely to play a part in the aetiology of the disease

Barbiturates

Patients who suffer with these visceral neuroses are both tired themselves and tiring to others who (unconsciously) react to them The administration of barbiturates is often a necessary part of treatment Nevertheless, the medical practitioner should consider that the prescription of barbiturates to his patients may possibly be a means of self protection and he will prescribe them less often if he remembers that they may undermine morale and delay recovery

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White, J C and Smithwick, R H (1942) *The Autonomic Nervous System* 2nd Ed, page 70 London, Henry Kimpton

FLATULENCE

Flatulence or wind generally refers to an excess of gas in the stomach or intestines The diagnosis is made on the patient's complaint of belching or of passing excess of wind per anum Alternatively, the complaint may be of abdominal distension in which case the distension may be due to loss of tone in the muscles of the abdominal wall, or even due to an abdominal tumour or ascites, and not to wind The diagnosis is confirmed by clinical examination, namely abdominal distension, a tympanitic note on percussion, and an increase of the area of abdominal resonance encroaching on the lower thorax on the left side and reducing the area of liver dullness on the right side

X ray examination is of value not only in confirming the presence of an excess of gas in the digestive tract, but also in locating it With regard to x-ray examination it is noted that there is always a little air in the fundus of the stomach which is evident in an x ray photograph of a patient in the upright position, but with the patient lying down the gas spreads out under the anterior wall of the stomach and does not show on x-ray examination unless present in considerable quantity On

cause of intestinal hurry such as the habit of taking a daily laxative in excess may lead to an excess of fat or starch *in the large intestine and so cause flatulence* The same cause is operative in fatty diarrhoea when there is a failure of fat assimilation in the small intestine, and also in intestinal carbohydrate dyspepsia in which there is a failure of starch digestion In both these conditions flatulence is one of the chief symptoms The abuse of laxatives may determine a too rapid movement of

patients whose stools are always loose often complain of flatulence and find themselves unable to digest eggs and other fatty foods, fruit and vegetables The treatment of these several conditions aims at restoring normal digestive function in the first place, by reducing the food content of whatever is irritating the colon, whether it is fat, starch or cellulose, and in the second place by restoring normal bowel function, both of food digestion and assimilation, and the rate of the passage of food residues through the digestive tract

In allergic states, digestive function may be normal, but the patient may be [illegible] is recognized by careful [illegible] allergic subject who has [illegible] disorder of the digestive tract Alcohol and tobacco smoking are occasional causes of intestinal flatulence The former is to be suspected when the patient is aware of alcohol having a laxative effect, or when, on inquiry, it is found that a patient who drinks alcohol, even perhaps in strict moderation, generally has loose stools and is constipated on a teetotal regimen Medicinal paraffin, more often than is generally realized, is the cause of intestinal flatulence

NEUROMUSCULAR DISORDERS

A lack of tone in the organs of the digestive tract may be a cause of flatulence, as in the case of individuals who get flatulent distension when they are tired towards *the end of the day On the same basis, perhaps, may be explained the flatulent* distension which often complicates congestive heart failure, portal obstruction (as in cirrhosis of the liver) and arteriosclerosis of the mesenteric vessels In some [illegible] the

REFLEX DISORDERS OF INTESTINAL RHYTHM

Flatulence, more often intestinal than gastric, may be due to arthritis of the [illegible]

activity of the digestive tract and the abdominal wall, which is responsible for the flatulence which so often follows abdominal operations It is in favour of this view that gentle massage of the muscles of the abdominal wall may relieve flatulence *and pain after a laparotomy (Evans, 1947) The preventive treatment of* post operative flatulence consists of a low residue diet previous to the operation, the

detailed examination must be made to exclude peptic ulcer, carcinoma of the stomach and pyloric obstruction, because rarely flatulence is an early symptom of these diseases. Cholecystography and barium enema x-ray examination may also

INTESTINAL FLATULENCE

gas either through the mouth or by the back passage.

symptomatic remedies such as charcoal, kaolin and carminatives are of little value.

TREATMENT

Intestinal obstruction

Flatulence may be the first symptom of an obstructive lesion of the digestive tract, whether in the small or large intestine It is, therefore, of great interest and

intestine where the lumen was contracted by an annular ring of cicatrization (perhaps due to healed Crohn's disease) Some years later the symptoms recurred and the diagnosis of intestinal obstruction was again made On this occasion the obstruction was due to a fibrous anus and the patient recovered after dilatation of the stricture by the daily passage of an anal bougie. The obstruction may be functional, that is to say, due simply to constipation which is generally in the lower bowel and due to a failure of the evacuating mechanism It is important to realize that in an individual whose stools are normal and whose bowels act regularly,

after the evening meal is an effective remedy for an uncomplicated case (*see* Constipation, page 703)

Intestinal Irritation

The colon is irritated by the presence of normal food residues in excess, such as may be due to over-large meals and food that is eaten hurriedly and badly masticated and, as a result, assimilation in the small intestine is incomplete Any other

light diet, avoiding the common indigestible foods for at least one year The diet need not be rigorous and it should *provide two pints of milk daily, priority* was given when milk was rationed It is desirable to augment the protein intake and for this purpose Bemax and dried milk are useful additions The patient should return to his former occupation whenever possible Smoking and alcohol are permissible in strict moderation a year after operation but any excess is to be avoided *In view of the risk of anaemia, it is a reasonable* precaution for the patient to have a medical review by his doctor, at first every six months and later once a year Partial gastrectomy [illegible]
this protection may [illegible]
become too great, a [illegible]
environmental difficulties

JEJUNAL ULCER

[illegible] ulcer is very [illegible] symptoms [illegible] treatment are very unsatisfactory and the treatment of preference is a partial gastrectomy Success with vagotomy has been claimed and this operation should be considered

After partial gastrectomy for duodenal ulcer, subsequent jejunal ulcer occurs in [illegible] (probably 3–5 per cent) It is extremely uncommon [illegible] for carci[illegible] [illegible]nptomatic relief It is possible for such ulcers to heal but, nevertheless, further surgical treatment is probably required A second gastrectomy, as subtotal as possible, is *required, alternatively, vagotomy may be advised*

Complications of Jejunal Ulcer

Haemorrhage

Acute haemorrhage, causing haematemesis and melaena, is not uncommon and *it is a sad reflection on the former use of gastro-enterostomy that 5 per cent* of all admissions for haemorrhage occur in subjects who have had a previous gastro enterostomy Treatment is as described on page 735

Perforation

Acute perforation is an unusual complication and demands immediate surgery Chronic perforation into surrounding viscera may cause a gastro-colic fistula, giving rise to great loss of weight with diarrhoea and excess of fat in the faeces After preliminary treatment to improve the general condition of the patient, surgical treatment is essential

WEAKNESS, NAUSEA AND DISCOMFORT AFTER MEALS

There are two distinct groups of cases, those with symptoms coming on soon after a meal and those with symptoms beginning 1–2 hours after a meal There are probably at least two mechanisms responsible "Dumping" or rapid emptying *into the small intestine may cause symptoms of nausea, faintness, intense weakness,* cold sweating and a sense of epigastric fullness The same effect may possibly be

regulation of bowel function before operation, and the avoidance, when possible, of excessive purgation and the pre-operative use of enemas After operation, so far as the circumstances of the case allow, the patient is encouraged to move about

wind a flatus tube, or a small enema of soap and water or of turpentine is given In some cases a teaspoonful of neat brandy or a teaspoonful of undiluted *crême de menthe* taken in sips is helpful As a tonic for the digestive tract, small doses of cascara may be given, namely liquid extract of cascara, 5–10 minims 2 or 3 times daily

EMOTIONAL STRAIN

Flatulence due to emotional strain or nervous tension is more common than is

dental emotional stress may cause abdominal distension and flatulence and how

including advice as to the value of steadying occupation and extra rest, together with the prescription of nerve sedatives such as Amytal, ½ grain, twice or three times daily before food An understanding of the central origin of flatulence in these cases is of great importance, both because the patient may be able materially to assist his own cure and also because the prescription of various diets and medicines is obviously useless

GEOFFREY EVANS
F AVERY JONES

Alvarez, W C (1943) *Nervous Indigestion and Pain* London, Heinemann
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GASTRIC SURGERY—SEQUELAE

With good selection of cases, the results of gastro-enterostomy or partial gastrectomy are excellent but there are certain complications which may supervene after the patient has fully recovered from the operation These include jejunal ulcer; recurrent bouts of abdominal pain, syndrome of weakness, faintness and sweating; morning nausea, anaemia, and ventral hernia

These delayed complications may be minimized by a satisfactory post-operative régime After partial gastrectomy, it is desirable for patients to continue with a

develop after the partial gastrectomy and this may be associated with macrocytic, hyperchromic anaemia Folic acid, 10 milligrams daily, crude liver extract, 4 millilitres twice weekly and proteolysed liver, for example Hepamino, may be needed

MORNING NAUSEA

Some patients complain of a sensation of nausea on waking in the morning It usually disappears as soon as the patient gets up and has something to drink. It may be due to bile accumulating in the stomach during the night, and it may be less troublesome if the patient sleeps on the right side

VENTRAL HERNIA

Ventral hernia occasionally develops, an abdominal belt may control the hernia adequately but further operation may be necessary for its repair

RECURRENT ABDOMINAL PAIN

Apart from jejunal ulcer, recurrent bouts of abdominal pain may be due to colon spasm or to gall stones It has been thought that the development of gallstones may be promoted by partial gastrectomy, but this has not been fully established

ACUTE DILATATION OF THE STOMACH

This is a rare condition, characterized by extreme dilatation of the stomach, usually coming on within a few days of an abdominal operation, but it may also occur as a complication of acute infections or without any concomitant cause It is probably essentially due to nervous reflex dilatation, but it may be aggravated by an arterio-mesenteric obstruction of the distal duodenum secondary to the dilatation of the stomach The onset is often insidious, with nausea, epigastric fullness,

tinuous gastric drainage or hourly aspiration, with the patient in a prone position with the foot of the bed raised Arterio-mesenteric pressure is thereby diminished Water may be given by mouth but the electrolytic balance must be maintained by rectal and intravenous fluids This can be usually achieved by giving alternate litres of 5 per cent dextrose in water and 5 per cent dextrose in normal saline solution, giving a total adequate to cover gastric aspiration plus 2,500 millilitres for basal requirements daily It is advisable to keep a check on the urine output, the blood urea, and the blood chlorides If the total fluid given is inadequate this will be reflected in the fall in urine output and the rise in blood urea If the sodium chloride is inadequate, this will be shown by a fall in the plasma chlorides (normal 560–620 milligrams per 100 millilitres) When giving large amounts of

to give aneurine, 50

milligrams daily to

the development of

Wernicke's encephalopathy Surgical treatment is not indicated and, with modern medical care, the previously high mortality has now become negligible

patient, unless directly questioned

The therapeutic possibilities include a high fat diet, the administration of 1 ounce of olive oil before meals, and food is better taken as six small meals rather than three ordinary sized meals Extra fat can be obtained as priority ration, if hypoglycaemia can be demonstrated. Ephedrine hydrochloride, ½ grain half an hour

with dry toast

ANAEMIA

Some degree of anaemia is particularly common after partial gastrectomy,

tendency for the anaemia to relapse There is no doubt that anaemia is common among those patients who persist with a very restricted diet Iron is absorbed chiefly in the first 18 inches of the small intestine and, after partial gastrectomy, the short-circuiting of food may reduce the amount of iron absorbed. In most cases,

frequently than alternate days If larger intervals are used, reactions become more

connexion between the needle and the syringe is a convenience. Excessive dosage is to be avoided.

In some cases there is evidence of associated vitamin B deficiency as shown by glossitis and cracks at the corners of the mouth, it is then advisable to give extra sources of the B complex, particularly Bemax, wholemeal bread, Aluzyme, autolysed yeast (½ ounce daily) In some patients, some degree of steatorrhoea may

cause of chronic gastritis is alcoholic intolerance or excess and, in some cases, it is thought to be due to drinking strong tea

GASTROSCOPY

If the diagnosis of chronic gastritis is based on gastroscopic examination, chronic gastritis is found to be less common than is generally supposed Even in *chronic alcoholics half the number of the individuals* have a normal gastric mucosa and many of the remainder show only minor changes On the other hand, atrophic changes in the gastric mucosa (gastropathy) may be found in patients without gastric

contents into the stomach from reverse peristalsis

TREATMENT

Aetiological

In the first place aetiological factors are dealt with, that is to say, treatment of infections of the upper respiratory tract and of the teeth and gums is effected It is important to make good any deficiency of the masticating surface When the con dition is due to intolerance or excess of alcohol a teetotal régime is advised

Dietetic

An ordinary varied diet including tender meat, fish, chicken and rabbit, with plenty of fruit and vegetables and plain puddings, is prescribed Fat foods are restricted, especially the less digestible fats, namely chocolate, cooked cheese suet, and starch cooked with fat such as pastry, batter, cakes and scones Potatoes *are eaten boiled, baked or mashed, and not roast, sauté or fried* Obviously indigestible foods are avoided namely pork, goose duck, pigeon and tough and twice cooked meat Obvious gastric irritants such as pickles and curries are avoided

Medicinal

given below may be better, it is taken with water 15 minutes before food

Powdered rhubarb	1 gr	60 mg
Sodium bicarbonate	15 gr	1 gr
Syrup of ginger	10 min	0 6 ml
Compound infusion of gentian to	½ fl oz	15 ml

Gastric lavage is seldom necessary except in the presence of excessive secretion of mucus as may be determined by a fractional test meal The solution used is sodium bicarbonate, 30 grains in a pint of tepid water

HAEMATEMESIS AND MELAENA

Haematemesis and melaena are usually due to bleeding from a peptic ulcer but they may occur from rupture of varicose veins of the oesophagus, from acute gastritis or

GASTRITIS

ACUTE

... of nausea, ... ptoms with ... adapted to clinical use is as follows

- Acute exogenous gastritis
  - (a) Simple gastritis (chemical, thermal, mechanical or bacterial)
  - (b) Corrosive poisoning
- Acute endogenous gastritis
  - (a) Infective or toxic
  - (b) Suppurative or purulent

Most of the more severe cases of acute simple exogenous gastritis are probably due to bacterial toxins from food poisoning

Endogenous gastritis is probably a common complication of many acute specific fevers and a widespread erosive and haemorrhagic gastritis has been found in necropsy studies An acute suppurative gastritis is an extremely serious and, fortunately, very rare type of acute gastritis It has been likened to an erysipelas of the stomach

Treatment

Rest in bed is necessary until the vomiting has ceased and no food or fluids are ...

Kaolini et Morphinae (*N F*) may be given 4-hourly; 5 minims of dilute hydrocyanic acid, may be added

Light kaolin	30 gr	2 g
Sodium bicarbonate	10 gr	0 6 g
Tincture of chloroform and morphine	10 min	0 6 ml
Water, to	½ fl oz	15 ml

Tincture of chloroform and morphine 10 minims contains morphine hydrochloride, $\frac{1}{25}$ grain, and dilute hydrocyanic acid, ¼ minim.

An acute gastritis may be one aspect of an acute gastro-enteritis and further treatment may be needed as described elsewhere (page 693)

CHRONIC

Chronic gastritis causing symptoms is probably an uncommon condition It may be an inflammatory reaction to bacterial infection or bacterial toxins reaching the stomach by way of swallowed sputum or it may occur from chronic infections of the para nasal sinuses, postnasal space, tonsils, teeth and gums The commonest

BLOOD TRANSFUSION

A specimen of oxalated ven[illegible] blood [illegible]
urea and blood group [illegible]
blood if transfusion is [illegible]
caution as the blood [illegible]
is usually raised and may be 120 milligrams per 100 millilitres after a serious haemorrhage [illegible]

A [illegible] blood transfusion should [illegible]

[illegible]

further bleeding If he would seem in danger of anoxaemia, then transfusion sh[illegible]

[illegible]

there is a haemodynamic state of the circulation 1–2 days after admission, with engorgement of cervical veins It is then particularly necessary to give blood slowly and packed cells should then be used for preference to whole blood If a trans fusion is necessary soon after acute bleeding, 2 bottles of blood are often desirable initially

DIET

The patient should be allowed one third normal saline solution as much as desired to allay thirst, and the solution should be easily accessible to the patient The extra salt is not unpleasant in this concentration and is needed to replace salt lost from the body The patient should have 5 ounce feeds 2 hourly, at first milk may be given and then a *purée* diet, but many will take a diet from the time of bleeding and there is no evidence that it promotes further bleeding

Purée Diet

6 a m	Cup of milky tea
8 a.m	Porridge and Bemax, thin bread and butter and jelly marmalade, cup of milky tea
10 a m	Cup of milk and biscuit
12 noon	Minced meat, chicken, or steamed fish mashed potato, carrot *purée* or cauliflower
2 p m	Egg custard or cereal pudding or apple *purée*; orange juice
4 p.m	Cup of milky tea, three slices of thin bread and butter; bramble jelly, sponge cake
6 p m	[illegible]
8 p.m	[illegible]
10 p m	[illegible]

Milk feeds during the night if awake Fluids to be tepid and not hot

oesophagitis, from a carcinoma of the stomach or a simple tumour in the alimentary canal Meckel's diverticulum or oesophageal hiatus hernia may be associated with acute haemorrhage, rare causes include telangiectasia affecting the alimentary canal and localized gastric arteriosclerosis Gastro-duodenal bleeding without evidence of brisk haemorrhage may be a sequel to post operative shock, diabetic coma, acute infections, blood diseases and uraemia In these conditions the bleeding is incidental and is overshadowed by the main disease process

About one third of all cases of haematemesis and melaena do not show evidence of peptic ulcer or other abnormalities when a barium meal is given between the second and fourth week after acute bleeding Many of these cases are due to acute gastric ulcers which heal quickly and these can be demonstrated by gastroscopy in about half of the cases so examined in the first 10 days after acute bleeding Probably others are due to acute ulcers in the duodenum or due to acute gastro-duodenitis

TREATMENT

General Principles

[illegible]

an irreversible damage and the patient may die even if the haemoglobin level is subsequently restored The patient must have sufficient fluid and so prevent the dehydration which formerly caused many deaths The diet should provide adequate vitamin and calorie intake By maintaining the blood level and the nutrition of the patient he will be able better to withstand further bleeding should it occur There

[illegible]

discussed fully, and only in a small group of patients is operative treatment justified

General Measures

The patient should be reassured It is particularly alarming for an individual to vomit blood and the anxiety induced may well aggravate the underlying cause of

[illegible]

history may be left until a later date, when the patient has recovered from the effects of acute haemorrhage

Sedatives reinforce the assurance and help to achieve a mental calmness, morphine, $\frac{1}{4}$–$\frac{1}{2}$ grain, or sodium phenobarbitone, 3 grains intramuscularly, should be used for this sedative effect

A chart must be kept, giving hourly pulse rate and occasional blood pressure readings, if there is circulatory collapse, the foot of the bed should be raised, otherwise the patient should be made comfortable in bed, pillows may be allowed if desired

of the stomach or the large bowel, particularly the caecum may be found in these circumstances.

PROGNOSIS

The prognosis of acute haemorrhage from peptic ulcer is very good in patients

no symptoms is extremely good.

F. AVERY JONES

HALITOSIS

AETIOLOGY

alveolaris (a nasty sweet odour), ulcerating carcinomas of the nasopharynx and the raw area left after an ordinary tooth extraction Retained secretions and food

Any condition which causes a furred tongue causes bad breath; such conditions are the acute specific and other fevers, biliousness and constipation Those who wake in the morning with a bad taste in the mouth generally have a bad breath.

TREATMENT

For the purposes of treatment it is convenient to divide halitosis into secondary and primary groups. The treatment of secondary halitosis due to a definite discoverable cause, depends on the cure or mitigation of the condition or disease of which it is a symptom. Common examples have been given in the introduction to this article.

PRIMARY HALITOSIS

Primary or essential halitosis is so-called when its aetiology is indefinite or obscure. It has been shown that essential halitosis may be due to the excretion in the breath of bad smelling volatile substances absorbed from the bowel and due to a fault in fat digestion. The symptom may be cured by a low-fat diet.

Indications for Surgery

A decision about the advisability of operation should be taken early in the treat

pyloric stenosis It may be wise to delay operation for a few days in order to get the patient better biochemically particularly if the blood urea is much raised Surgery is also needed if acute perforation should supervene after bleeding This occurs in about 1 per cent of all admissions for haemorrhage and is a particularly lethal combination Haematemesis and melaena may also follow admission for an acute perforation and there is usually a double chronic ulcer or a giant ulcer and partial gastrectomy is the treatment of choice

Aperients

The bowels usually do not move for 4 or 5 days after acute haemorrhage has ceased It is probably best to avoid the use of aperients or enemas initially and to give an enema on the fourth day The patient should be assured that this is the best treatment

Medication

Iron in the form of Fersolate Tablets 3 grains thrice daily, should be given by mouth as soon as the stools are normal in colour Antacids should be prescribed from the time of admission and during the first few days it may be advantageous to give double doses of Aludrox that is $\frac{1}{2}$ ounce 2 hourly by day Sedatives may be required and phenobarbitone $\frac{1}{4}$–1 grain three times daily may be ordered Ascorbic acid, 200 milligrams three times daily for 5 days and then 50 milligrams daily is recommended

Special Measures

For duodenal ulcer, the possibility of a milk drip may be considered, giving 6 pints in 24 hours through a Ryle s tube

AFTER TREATMENT

The patient should have a barium meal as soon as he can get up usually between the second and fourth week it is unsatisfactory to x ray a patient who cannot stand If there is any unusual aspect about the clinical history or about the skiagram a gastroscopy may be of value

Stools for occult blood should be examined until 3 negative results have been obtained If the stools fail to become negative, further radiological examination of the alimentary canal and gastroscopy is needed and a laparotomy should be performed if there is still doubt about the diagnosis Meckel s diverticulum carcinoma

the hiccup has persisted for some time that the patient asks the help of the doctor It should be borne in mind however that if the sufferer is a feeble infant or a frail old person even a few hours of hiccupping can be dangerously exhausting

When the disorder is bad enough to require the advice of a doctor, he can begin by suggesting various simple measures which may or may not be successful—for example holding the breath breathing and rebreathing into a closed bag as a rough

by some form of gastric irritation, a carminative mixture or a teaspoonful of sal volatile, or 5 minims of oil of cajaput on a lump of sugar may stop it

Dilatation and atony of the stomach call for gastric la
saline solutio

given either by rectum or intravenously It is important not to rest the stomach at the cost of water and salt depletion

In addition to combating any known general or local factors nerve sedatives would appear to be logical and the choice may be made from such drugs as bromide and chloral hydrate chlorbutol sodium phenobarbitone or hyoscine Heroin hydrochloride grain $\frac{1}{12}$ to $\frac{1}{8}$ by injection and cocaine hydrochloride grain $\frac{1}{6}$ to $\frac{1}{4}$ given by mouth in an acid mixture also have their advocates Morphine should be avoided, if possible In some patients, the inhalation of carbon dioxide (7 per cent carbon dioxide in oxygen) may be successful in stopping the hiccup Occasionally, as in some instances of encephalitic hiccup atropine (in $\frac{1}{100}$ grain doses) or benzyl benzoate (30 minims of a 20 per cent solution every 4 hours) has proved effective

The very multitude of measures which have been used in treatment suggests that medication is uncertain in its results Indeed it may well be that cessation of the hiccup is often spontaneous, whatever methods are adopted If, in spite of these various methods the hiccup persists to the threat of exhaustion, temporary paralysis of the phrenic nerves is justifiable

ROBERT COOPE

IDIOPATHIC MEGACOLON IN ADULTS

In idiopathic megacolon in adults constipation is often present since birth but it can be controlled by the regular daily use of mild aperients Serious constipation however develops after a number of years

symptom The breath has no bad odour, the tongue is clean, the mouth is healthy and no cause for halitosis is found For these people confirmatory evidence of the presence of the disorder is required from a husband, wife, mother or other close relation In fact the patient may have made a wrong diagnosis and the problem before the practitioner is to discover how the mistaken diagnosis has arisen It may be a symptom of an anxiety state or rarely of a psychosis

Symptomatic treatment is directed towards improving digestion, regulating bowel

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HICCUP

Hiccup results from a sharp involuntary contraction of the diaphragm This sucks air in through a partially closed glottis, with a resulting typical noise which may be represented by the sound "ukk" The abrupt ending of the inspiration (and of the noise) is brought about by complete closure of the glottis Hiccup may be induced by stimulation, centrally or peripherally, of the nerves and nerve centres which are involved in the reflex—the phrenic nerve to the diaphragm and the vagus nerve

disorders Simple irritation of the gastric mucosa by hot drinks or spices, by alcohol, by gaseous distension or by atonic dilatation may produce it, as also may acute dilatation of the stomach, intestinal obstruction, various forms of enteritis or colitis, and the meteorism associated with peritonitis Irritation of the phrenic nerve in any part of its course may also cause hiccup, as by mediastinal tumours, pericarditis, mediastinal pleurisy, aneurysm, subphrenic abcesss and other conditions Central irritation may arise from any form of toxaemia, especially uraemia or severe hepatic insufficiency, from infections such as encephalitis or meningitis, or from brain tumour Sometimes no obvious cause may be found and the origin may then be some unknown inflammation affecting the nerve nuclei, or the condition may be hysterical

night, and utterly prevent sleep

TREATMENT

Clearly the first essential in treatment is to deal with the underlying cause, if this is at all possible In conditions such as uraemia or acute peritonitis, obstinate hiccup

faeces causing the obstruction is removed and it becomes safe to give aloes and paraffin daily as advised above

The symptoms of intestinal obstruction may be due to wind, from which relief can be obtained by the passage of a flatus tube with the patient in the knee-elbow position In other cases there may be a partial volvulus of the pelvic colon, and this may have to be treated surgically if it is recurrent

Major surgical procedures, including ileo sigmoidostomy, are rarely indicated

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Hurst, A (1946) *A Textbook of the Practice of Medicine*, 7th ed London Oxford Medical Publications

MOTION-SICKNESS

Motion sickness may be produced by almost any form of movement, and has been extensively studied by the use of swings and lifts, as well as in various forms of transport (Hemingway, 1946) It is due to the effects of such movement upon the vestibular apparatus and is abolished in animals by bilateral labyrinthectomy It is very rare in babies, is not abolished by blindness, is markedly influenced by suggestion, and can be readily produced in some animals, for example, dogs, but never in others, such as cats Approximately half the adult general population is susceptible to travel sickness, whether in ship, aircraft, train, or motor-car, and perhaps half of these severely so Some individuals are almost completely immune from any manifestations of motion sickness, whilst in others tolerance to the movement can be very quickly acquired, though as a rule only to one form of movement, such as that of a big liner, and not at the same time to another, such as that of a sailing-boat The most important predisposing factor is thus a constitutional one, which, contrary to general opinion, is not consistently related to any particular psychological or physical make up The worst travellers are nevertheless often highly anxious, self conscious people with a profound sense of inferiority, and these unfortunate sufferers rarely acquire any acclimatization to motion sickness how ever often or for however long they travel, they tend indeed to become more and more susceptible, so that in the end their only hope of real relief is to avoid travelling altogether

Other important predisposing factors, some of which are readily controllable, are fatigue, apprehension, cold, and suggestion, pre-existing dyspepsia, bad ventilation, noise and bad smells are additional causes Labyrinthine or middle ear disease may play a part in only very few cases.

TREATMENT

PREVENTIVE

There is no doubt that the horizontal position, fresh air, and a lightly filled stomach all help to lessen the symptoms Large amounts of fluids should be avoided, and it is certainly wise to fix the eyes upon some object on the horizon rather than to watch the movement of objects close at hand as they go by with the motion of the ship or train

always be done, because there are rare cases in which a fibrous stricture at the pelvirectal junction is the cause of the megacolon· this stricture may be difficult to visualize by x-ray examination.

A distinction has been made in the past between Hirschsprung's disease in children and idiopathic megacolon in adults on the evidence that (a) the history of constipation does not date back to childhood in all cases of idiopathic megacolon, (b) Hurst (1946) found that Hirschsprung's disease occurred almost exclusively in boys, whereas the incidence of megacolon was about equal in the two [illegible]

TREATMENT

The severity of idiopathic megacolon varies considerably in adults. There are some cases in which the patient's complaint is simply that of a mild degree of constipation The condition is diagnosed by moderate abdominal distension and a [illegible]

twice daily as a routine

In more severe cases, in which symptoms interfere with the patient's comfort and activities, a routine plan of treatment should be instituted In the first place, any accumulation of faecal material in the rectum and the lower bowel, or perhaps [illegible]

aloes (one or two Calsalette tablets) daily after the evening meal In addition a conical bougie, with a maximum diameter of 3·75 centimetres and with a proximal flange to prevent the instrument slipping into the rectum, is passed every morning and left in position for a few minutes

There is often an aggravating factor, the relief of which makes all the difference to successful treatment The patient's health may have been impaired by long- [illegible]

time under low pressure and running it out. Paraffin oil, 6–8 ounces, is run into the rectum at bedtime and retained By these means, repeated daily, the mass of

much less value once any serious degree of movement has begun Of all the seda tives which have been employed—bromides, chloral hydrate, Chloretone (chlor butol) and barbiturates—none is as helpful as is the barbituric acid group, of which Nembutal or Sodium Amytal is perhaps the most efficient for this purpose The dose of either of these is 1½ grains, given 4 hourly with food for 12–24 hours before starting a journey, 3 grains may be given for the final 1 or 2 doses in any highly nervous or frightened person If a combined remedy is to be used, some prepara tion containing one or more of the belladonna alkaloids with a barbitone is the most rational Hyoscine (0 1 milligram) with hyoscyamine (0 3 milligram) was used in the Canadian Army (Noble, Sellers and Best, 1947) and a useful proprietary mixture with the following formula is sold under the name T S R

Hyoscine hydrobromide	$\frac{1}{300}$ gr	0 2 mg
Atropine sulphate	$\frac{1}{450}$ gr	0 15 mg
Luminal	½ gr	30 mg

The dosage is 1 or 2 tablets at the start of a journey, followed by 1 tablet 4-hourly as indicated

Benzedrine (amphetamine), when compared directly with hyoscine, has been found to be of little or no value in seasickness, and ergotamine also has been shown to be ineffective either before or during an attack

FITNESS FOR AIR TRAVEL

Mot on-s ckness the ch

... dehydration may be so severe as even to endanger life Similarly, in air travel ex treme degrees of air sickness may affect individuals so seriously that a flight may have to abandoned, or personnel in the aircraft may become unable to carry out their duties In the course of war, vital operations by airborne or sea borne troops may be so affected that success or failure may depend upon the control of motion sickness In civil practice the matter may give rise to special problems as regards the assessment of fitness for air travel of patients suffering from particular disabilities This question has been recently reviewed by the three chief medical officers of the British Overseas Airways Corporation, the British European Airways Corporation and the British South American Airways Corporation, and their conclusions are summarized in their paper in the form of a tabulated list of medical contra indica tions to air travel (Whittingham, Barbour, and Macgown, 1949) The airline medical authority concerned is always prepared to assist doctors in advice on this problem In general public air transport rarely flies above 8 000 feet and in most aircraft the oxygen pressure is adjusted to correspond to this altitude or lower even if the actual height is 15,000 feet or over The effects of lowered oxygen ten sion, even at heights well below 10 000 feet, must be most carefully considered in

suffering from coronary artery disease, angina pectoris, or hypertension may be

MEDICINAL

Hyoscine hydrobromide

felt This dose may cause slight dryness of the mouth, but otherwise produces very few toxic effects, and can safely be repeated in 6–8 hours, or even sooner if necessary Double this dose may indeed be safely given without obvious ill effects upon physical activity or on near vision If hyoscine is used it is advised not to combine it with other drugs, as little advantage is gained thereby whilst any toxic effects may easily be confused

Dramamine

It is possible to compare fairly the respective merits of seasickness remedies only when they are used at the same time in the same ship, and when the effects of suggestion can be excluded by the use of proper controls and by suitable precautions to prevent the non-sick seeing the sick vomit Such a controlled test was carried out in the United States Army Transport *General Ballou* by Gay and Carliner (1949) using a drug known as Dramamine (β-dimethylaminoethyl benzohydryl ether 8-chlorotheophyllinate) This is a compound of theophylline com-

millilitres of saline solution are injected into the rectum at the same time. Up to the

mine when they were then all cured Of 195 seasick men in this ship who were

any symptoms of sickness began, none developed nausea or vomiting during two days' treatment When treatment was stopped 41 became sick within 18 hours of

Dramamine was substituted for the placebo drug. These tests suggest that a new and valuable remedy may have been found, and further confirmation of these results will be awaited with great interest, especially as regards the freedom from toxic effects and the precise dosage that may ultimately be advisable.

Other Sedatives

Other sedatives have a definite place in treatment, especially as preventives of apprehension and lack of confidence before setting off on a journey; they are of

much less value *once any serious degree of movement has begun Of all the* seda tives which have been employed—bromides, chloral hydrate, Chloretone (chlorbutol) and barbiturates—none is as helpful as is the barbituric acid group, of which Nembutal or Sodium Amytal is perhaps the most efficient for this purpose The dose of either of these is 1½ grains, given 4 hourly with food for 12–24 hours before starting a journey, 3 grains may be given for the final 1 or 2 doses in any highly nervous or frightened person *If a combined remedy is to be used, some* preparation containing one or more of the belladonna alkaloids with a barbitone is the most rational Hyoscine (0 1 milligram) with hyoscyamine (0 3 milligram) was used in the Canadian Army (Noble, Sellers and Best, 1947) and a useful proprietary mixture with the following formula is sold under the name T S R

Hyoscine hydrobromide	$\frac{1}{300}$ gr	0 2 mg
Atropine sulphate	$\frac{1}{400}$ gr	*0 15 mg*
Luminal	½ gr	30 mg

The dosage is 1 or 2 tablets at the start of a journey, followed by 1 tablet 4-hourly as indicated

Benzedrine (amphetamine), when compared directly with hyoscine, has been found to be of little or no value in seasickness, and ergotamine also has been shown *to be ineffective either before or during an attack*

FITNESS FOR AIR TRAVEL

dehydration may be so severe as even to endanger life Similarly, in air travel extreme degrees of air sickness may affect individuals so seriously that a flight may have to abandoned, or personnel in the aircraft may become unable to carry out their duties In the course of war, vital operations by airborne or sea-borne troops may be so affected that success or failure may depend upon the control of motion sickness In civil practice the matter may give rise to special problems as regards the assessment of fitness for air travel of patients suffering from particular disabilities This question has been recently reviewed by the three chief medical officers of the British Overseas Airways Corporation, the British European Airways Corporation, and the British South American Airways Corporation, and their conclusions are summarized in their paper in the form of a tabulated list of medical contra indications to air travel (Whittingham, Barbour, and Macgown, 1949) The airline medical authority concerned is always prepared to assist doctors in advice on this problem *In general, public air transport rarely flies above 8 000 feet, and in most* aircraft the oxygen pressure is adjusted to correspond to this altitude or lower, [illegible] The effects of lowered oxygen ten-
most carefully considered in
anaemia, or cardiac or pul-
monary disorders Any patient whose haemoglobin level is below 60 per cent is [illegible] travel, and oxygen must be avail-
heart or lung disease *Individuals*
pectoris, or hypertension may be

adversely affected by the nervous excitement and anxiety of an air journey, and a severe case should not be allowed to travel in a non pressurized aircraft owing to the risk of

advised to

asthma, or

Age alone is no bar to flying, but when associated with extreme anxiety or feebleness, a companion or nurse as an attendant is usually desirable Definite mental symptoms demand the accompaniment of a nurse or doctor, and as a rule should preclude air travel Patients suffering from infections of the nose or ears should avoid flying if possible, as the changes in atmospheric pressure may cause spread of infection to sinuses or middle ear Those who have any chronic obstruction of paranasal sinuses or Eustachian tubes may suffer severe painduring descent, owing to their being unable to adjust the air pressure in the middle ear Pregnancy need not prevent air travel if ordinary precautions are taken

THOMAS HUNT

Gay, L. N, and Carliner, P E. (1949) *Bull Johns Hopk Hosp*, 84 470
Hemingway, A (1946) *J Aviat Med*, 17, 80
Noble R L., Sellers, E A, and Best, C H (1947) *Canad med Ass J*, 56, 417
Whittingham, H, Barbour, A B, and Macgown, J C (1949) *Brit med J*, 1, 603

PEPTIC ULCERATION

Gastric and duodenal ulcers vary greatly in size and chronicity They may be small, shallow and superficial, with rapid healing, or large, penetrating the wall of the stomach or duodenum and healing slowly There is a tendency to recurrence of ulceration

PATHOLOGY

The usual sites for ulcers are on the lesser curve and posterior wall of the stomach and in the first part of the duodenum The ulcer may heal without visible scarring but usually leaves visible evidence, which may be seen gastroscopically or *post mortem* The fibrosis of a healed chronic ulcer, or from the healing of recurrent ulcers, may lead to obstruction in the region of the pylorus, causing pyloric stenosis, or much less commonly in the body of the stomach, producing mid gastric stenosis or " hour-glass" stomach The ulcer may erode a vessel and cause haematemesis or melaena, or it may perforate into the peritoneal cavity Malignant degeneration of

increasing stresses and strains, mental and physical, of modern-day in
There is a notable deficiency of ulcers among agricultural workers whe
with city dwellers

AETIOLOGY

There is no doubt that the psychosomatic aspect of peptic ulcer i
aetiologically It is common for a haemorrhage or perforation to f

being particularly sensitive, they are upset by details which others migi
and, being energetic and conscientious, they expose themselves to more i
do their fellow men

Peptic ulcer is much commoner (80 per cent) in men than in women ai
there is some endocrine factor which protects women, particularly
reproductive period of life

yet many ulcers have healed, even in the continued presence of hyperaci

There is no doubt that the emphasis for treatment should be dir
towards treating the patient himself by providing mental and physic
adequate nutrition than by directing therapy primarily towards the ulc
of the alimentary canal

GENERAL MANAGEMENT

A full history of the complaint is essential It is impossible to get
history in many cases in a hospital ward, the patient needs to be seei
addition to the general medical details a full biographical survey is re
gether with an assessment of the personality of the individual The unbu
many of the environmental difficulties, often for the first time, may in it
valuable therapeutic effect The physician, as an independent observer, n

tion, resulting from autonomic over-activity.

There is no doubt that the assistance of a psychiatrist may be valuable
can be done by the physician himself, provided he is prepared to take the
time over the history

Ideally, the patient should remain in bed until the ulcer is healed but
always a practicable recommendation It may be difficult to arrange
rest in bed in hospital or nursing home or at home Consideration mus

ambulatory treatment Peptic ulcers can heal up without rest but there is
a greater risk of the ulcer becoming chronic or of complications supervene

adversely affected by the nervous excitement and anxiety of an air jou
severe case should not be allowed to travel in a non pressurized aircraf
the risk of anoxia Patients who develop cardiac pain on slight exertio
advised to avoid all flights in aircraft, as also are those suffering fron
asthma, or who show a pulsus alternans. In cases of pulmonary disease, it
in general to advise against air travel and to forbid it unless the aircraft is
ized to a level of 5,000 feet and oxygen is available Patients with active pul
tuberculosis should also avoid flying, both on their own account and owing
possible risk to others

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ness, a companion or nurse as an attendant is usually desirable Definite m
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(Adexolin capsules contain vitamin A, 6,000 i u and vitamin D, 1,000 i u Radiostoleum capsules contain vitamin A, 6,000 i u, vitamin D, 1,200 i u)

Vitamin B—Bemax, 2 dessertspoonfuls daily

Sedatives

½

b

tion for the first few days of rest in bed

Aperients

A dessertspoonful of liquid paraffin twice a day may be required, some patients may need the following aperient

Phenolphthalein	1½–3 gr	0 1–0 2 g
Powdered rhubarb	3 gr	0 2 g

Simple enemas are, on the whole, preferable to aperients

General

Patients should get up for toilet unless there is considerable pain Bed exercises should be performed (*see* page 753)

The patient should remain under supervision until healing of the ulcer has been obtained If this is not achieved the question of surgery must be considered

SURGICAL TREATMENT

considered

(1) In patients under 45 years of age, the chance of death from a complication is very small Surgery, if undertaken, is usually indicated to save a man's job rather than his life Crippling relapses may make it difficult to maintain an economic existence and surgery is then indicated

f death from

10 per cent have perf rated u cers and 20 pe

vivors have

proximately

he surgeon

tween 2–10

per cent for simple ulcers

(4) In the case of a chronic gastric ulcer, there is a small risk of malignant degeneration but this is exceptionally small for ulcers between the angulus and the cardia Ulcers in the pyloric antrum are potentially malignant and a bias for surgery

is tremendous variation in the rate of healing of ulcers Four weeks may be suffi
for many cases of gastric ulcer but 6 weeks is preferable for duodenal u
Larger gastric ulcers may need 8–10 weeks Apart from the beneficial effec
healing, rest in bed away from home provides an opportunity for reflection, a
life may be restarted with a better perspective The complete break makes it easi
for excessive commitments to be shed without loss of prestige

The patient is best advised to give up tobacco altogether If this is impossible
smoking should be restricted to a few cigarettes smoked after meals The advantage
of complete abstinence is that a recurrence of heavy smoking is less likely at a sub-
sequent time of crisis

DIETETIC TREATMENT

The basis of dietetic treatment is 2-hourly milk feeds and, as soon as pain sub-
sides, adding bland foods to the feeds to increase calorie and protein intake and to
maintain vitamin content The rate of increase is dependent on the symptomatic
response and, if feeds are increased in size too quickly, then pain will continue
Once the pain has subsided, a highly nutritious bland diet, which enables the patient
to increase in weight, probably gives best results Previously the diet has been kept
dull and unattractive but this policy is probably incorrect The mental outlook of
the patient is so important that irritation from an unappetizing diet probably off-
sets the advantage of diminished acid secretion during the psychic phase

The diets given below are practical but not optimum, as more protein and fat in
the form of eggs and cream would be additions of real value

First stage

Two-hourly milk feeds may be given and 5-ounce alternate feeds may comprise
gg and milk or Benger's Food, Ovaltine, Horlicks, malted milk or junket. An ex-
mple of stage I diet is given below

Stage I (strict)

8 a m —5 ounces of custard mixture
0 a m.—5 ounces of milk.
noon—5 ounces of custard mixture
p m —5 ounces of milk
p m —5 ounces of custard mixture
m —5 ounces of milk
m —5 ounces of custard mixture
m —5 ounces of milk
ht (if awake) 5 ounces of milk may be given

ds should be taken warm (not hot) and plain water in small quantities may
d between the feeds Between each feed (that is, at 9 and 11 a m , and at
and 9 p m.) and at night, if awake, alkaline powder or medicine should be

s vomiting, the milk should be diluted half and half with water and only
ken at each feed
s no vomiting and pain rapidly improves, two plain biscuits may be
wo small pieces of crisp toast, buttered when cold, taken at 10 a m ,
p m with the 5 ounces of milk If improvement continues, the

or shell egg, tinned salmon, meat or fish paste, Spam, pilchards or sardines, minced lamb, mutton, chicken, rabbit, well-cooked fish tomato *purée* or Marmite as

and gravy, omelette or other egg dishes, macaroni cheese, spaghetti or baked beans on toast, plain tripe, boiled fish, suitable pudding (*see* suitable Puddings, page 749), *bread, butter and cheese, jelly or seedless jam,* plain minced meat (cottage pie and the like)

General precautions

meals are permissible

Alcohol is best omitted for 6 months after the ulcer has healed and then allowed only in moderation

attack, which might otherwise persist for weeks or months

Continued medication with antacids or atropine is not necessary after healing has occurred, but should be resumed at once if there is a relapse

ACKNOWLEDGEMENTS

The dietetic instructions are very similar to those described by C M Fletcher Reprints of his paper may be obtained from the *Practitioner* (January, 1949) and are a considerable convenience and help to patients

PERFORATED PEPTIC ULCER

DIAGNOSIS

Acute perforation of a peptic ulcer into the general peritoneal cavity is usually dramatic in its onset and the patient can give the precise time of onset of the extremely severe pain, worse than anything he has previously experienced Such a pain in a patient known to have a peptic ulcer must be regarded as evidence of perforation unless proved otherwise About 10 per cent of ulcers perforate without having caused previous dyspepsia and it is in this group that the differential diag nosis of sudden onset of severe pain in the upper abdomen must be borne in mind Tabetic crisis, herpes zoster, collapse of a dorsal vertebra pancreatitis, torsion of the omentum intestinal obstruction, pleurisy, spontaneous pneumothorax all rd be

atypical at first because of a very slight leak The symptoms may resemble an exacerbation of an active ulcer and the leak may be confirmed by the unexpected radiological finding of air under the diaphragm Such cases usually seal themselves off satisfactorily A greater difficulty in diagnosis arises from the cessation of pain

should be exercised against them The exact position of juxtapyloric ulcers is often difficult to assess radiologically Some of them are really duodenal and, if there is doubt, gastroscopy may be helpful

(5) The operation is extremely successful in the majority of cases and restores a

AFTER-TREATMENT

The management of peptic ulcer does not finish with the healing of the ulcer There is a tendency to relapse and special care must be exercised

Mental attitude

A clear understanding by the patient of the effect of emotional reactions in predisposing to or causing ulceration is the first essential It is not so much the presence of environmental difficulties but the way in which they are faced There must be a calm, philosophical outlook and a refusal to allow small troubles to accumulate into a pent up load of resentment or frustration To a certain extent, the patients have allowed worrying to become a bad habit, but one which can still be controlled

a special diet

The medical adviser can assist the individual by a sympathetic understanding of the difficulties and by giving the advice which seems best to the independent observer

It is important to avoid undue fatigue and the opportunity of the illness should be taken to reduce on medical advice, the number of commitments The aim of medical treatment is to return the patients to the work for which they are specially trained, and change of occupation may often cause more problems than it solves Regular hours of work are highly desirable and limitation of overtime duties is necessary

Dietetic restriction

Some dietetic restriction is probably of value in preventing further relapses but a fetish must not be made of the diet It is reasonable to restrict foods given in the following list

given below

(1) Sandwiches should be taken to work These should be made with crustless bread (not new) Suitable fillings are grated or processed cheese, scrambled dried

The sol ...

with very little, if any, discomfort A steady drip, giving a pint in 4 hours should be maintained If there is vomiting or loss of gastric fluid by aspiration, this volume of fluid should be replaced by normal saline solution and 4 pints of tap water may be added and given per rectum Should there be any difficulty about rectal fluids, which is uncommon, the patient may be given 4 3 per cent glucose with 0 18 per cent of sodium chloride in distilled water, or 5 per cent glucose in distilled water intravenously It is important to avoid overloading of the tissues with too much normal saline solution as this causes hydraemia and predisposes to oedema of the lungs If there is considerable loss of gastric fluid by aspiration or vomiting and measurements are difficult to obtain, it is usually sufficient to give alternate pints of normal saline solution and tap water per rectum, or normal saline solution with 5 per cent dextrose alternately with 5 per cent dextrose in distilled water intravenously With prolonged aspiration it is advisable to check the blood urea and plasma chlorides

(5) In the first 24 ...

(6) In the secon ... distension, and if ... may be given per rectum

(7) In the third 24 hours the patient should be given 5-ounce feeds 2 hourly and 3 pints of rectal fluid

(8) During the fourth 24 hours a light diet may be allowed and rectal fluid should be discontinued

(9) To allay pain, morphine sulphate, $\frac{1}{6}$–$\frac{1}{4}$ grain may be given the first night, and pethidine, 100 milligrams intramuscularly subsequently Pethidine has less effect on the cough reflex than morphine

(10) Coughing should be encouraged if there is any sputum The sides of the chest are supported firmly and the patient supports his abdomen with his hands and then coughs If this is too painful pethidine may be given previously Free expectoration may prevent or mitigate the very common basal atelectasis, and a

... 4 grammes

... r if there is ... nplications

Every case of perforation should have a thorough medical assessment before leaving hospital and should come under the supervision of the physician

De Bakey, M (1940) *Surgery*, 8, 852, 1028

PROCTALGIA FUGAX

Proctalgia fugax is the name given to severe, almost agonizing pain in the rectum sometimes of several minutes' duration and generally occurring in the night Highly strung neurotic and over tired individuals are especially liable to it

TREATMENT

In a desperately ill patient with a neglected perforation it is possible and advis able to treat him medically by emptying the stomach using an oesophageal tube and for preference a Senoran evacuator A Ryle tube is then passed through the nostril into the stomach which is kept empty by continuous suction Intravenous

tion is the treatment of choice Until a few years ago the operative mortality associated with acute perforation exceeded 20 per cent in practically every large series from general hospitals De Bakey (1940) reviewed over 20 000 cases collected from the literature and found a mortality of 25 2 per cent In recent years the mortality has declined steeply with the improvements in anaesthetic technique and with the use of penicillin and the sulphonamides after operation The use of curare has enabled much lighter anaesthetics to be given a most important point in the management of those who are extremely ill or who are elderly This fall in mortality may be illustrated by the writer s experience at the Central Middlesex County Hospital in 1940–42 There were 103 operations for acute perforation and 25 died (25 per cent) in the same hospital in 1947–48 there were 106 operations with 4 deaths (4 per cent) The fall in mortality cannot be explained by earlier operation or by a younger population for the groups are similar and indeed the age distri bution is slightly older in the later cases

SCHEDULE OF TREATMENT AT CENTRAL MIDDLESEX COUNTY HOSPITAL

feet up and down the bed 6 times

(2) An hourly reading of the pulse for 36 hours should be recorded

(3) A Ryle tube is passed before the patient goes to the theatre and it remains down for at least 24 hours after operation Hourly aspiration will prevent any accumulation of fluid The tube should be re inserted should any post operative vomiting or abdominal distension supervene The patient should not be kept flat

(4) Dilute saline solution should be given rectally using one part of normal aline to four parts of tap water The aim should be 6 pints for the first 24 hours

tone and belladonna may be given

PREPARATION FOR SURGICAL TREATMENT

Some cases will resolve quickly and it may not be necessary to consider surgery, but a gastro-enterostomy or partial gastrectomy may be necessary If there is some response
operation for .
be assisted by
Fortified milk feeds will enable this to be achieved

	Carbo-hydrate	Protein	Fat
10 oz milk .	12	10	10
2 oz. half-cream dried milk . .	22	15	8
1 oz. Lactose . .	30		
1½ oz Prosol (Trufood) . .	12	28	
		53 grammes	

Tomato, vanilla, coffee or Bourn-Vita may be used for flavouring and two or three feeds of 5 ounces each may be given during the day

NEOPLASTIC OBSTRUCTION

Pyloric stenosis which does not improve at all, or gets worse during medical treatment, is usually due to neoplastic obstruction

REGIONAL ILEITIS, CHRONIC (CROHN'S DISEASE)

The decision as to whether the treatment of chronic regional ileitis should be medical or surgical depends on both the nature of the case and the experience of the physician or surgeon responsible for making the decision

Surgery

It is well known that the disease can resolve and that recurrence may occur, though this is by no means the rule In an acute case laparotomy is advised, both in order to establish the diagnosis and with a view to excision of the affected length of bowel, if the disease is limited in its extent and severe in its incidence Even if it is

circumstances a two-stage operation may be undertaken, namely, a short-circuit operation in the first place with exclusion of the diseased bowel and excision at a later date When the disease heals with expectant treatment only, resolution may be

TREATMENT

General measures are prescribed to correct the state of debility or nervous ex haustion when present Incomplete evacuation of the rectum in defaecation is a contributory cause and rectal dyschezia should be treated If the attacks are fre quently recurrent a plain warm water enema should be given before going to bed In an attack the pain may be relieved by firm pressure on the perineum

PYLORIC STENOSIS

Obstruction at the pyloric ring may be due to spasm or to oedema in relation to an ulcer in this region to scarring from healing of the ulcer or to neoplastic disease

MANAGEMENT OF A CASE

The general principles of treatment are to restore the fluid balance and thereby to correct the blood chemistry and to empty the stomach and to prevent further over distension Except in the most severe cases it is sufficient to empty the stomach once a day in the evening so that the stomach can regain its normal size and tonus during the night Some degree of gastric retention is not uncommon with an active peptic ulcer particularly a juxtapyloric ulcer and many cases will respond satis factorily to medical treatment as the oedema and spasm subside If this is not successful then it is necessary to operate to overcome the mechanical difficulty by gastro-enterostomy or partial gastrectomy

MEDICAL TREATMENT

An oesophageal tube is passed and the stomach is emptied using a Senoran

haemoglobin level

An intravenous drip of 5 per cent glucose saline solution is started A preliminary 3 000 millilitres at a rate of 40 drops a minute is usually needed init ally The probable amount needed to restore the blood chlorides to a normal range may be

At first 5 ounce milk feeds may be given 2 hourly and later the ulcer diet may be used

Blood transfusions to raise the haemoglobin level to at least 80 per cent are necessary

The stomach should be emptied each night at 10 p m

The volume of the res dual fluid removed is given as normal saline solution in a rectal drip some time during the next 24 hours

Diet

In adults, it is usually possible to provide a diet containing 30–50 grammes fat, 100–120 grammes protein and 200 grammes carbohydrate Dried milk protein, for example Sprulac (Cow and Gate) or Pepsac (Trufood) is a most valuable supplement to skimmed milk *Lightly cooked liver (not fried) is a valuable addition to the* diet Lean meat, chicken, fish eggs and Bemax are other sources of protein which may be given Fruit such as apples, bananas, oranges and strawberries are allowed and should be given initially in the form of purées jellies or juices Initially, skimmed milk should be used but full-cream milk may be added if there is satisfactory initial response to treatment Butter should be limited to not more than 1 ounce *daily Starchy foods, such as potatoes and cereals, and concentrated sugary foods* such as sweets and dried fruit, should not be given initially but may be cautiously added when improvement has begun Other foods to be avoided include the highly seasoned and spiced foods, fat meat (pork) and fat poultry (duck) fish (salmon, trout, mackerel and herring), cream, and food cooked in fat or with fat, such as pastry When bread is introduced into the diet, it should be toasted and new bread should be avoided *Salt should be used liberally but other condiments* are best avoided

Medication

Folic acid should be prescribed, giving 20 milligrams daily for 2 weeks and then 10 milligrams daily Although the diarrhoea may improve, this is not due to improved absorption of fat and it is necessary to continue with a *low fat diet Liver* [illegible] extracts [illegible] as Campolon or Hepa

[illegible]

Dried yeast is a valuable adjunct and up to 1 ounce of dried yeast daily should be given It may be made more palatable by giving it in water with a little sugar Initially, aneurine, 25 milligrams, nicotinamide, 200 milligrams, and riboflavine, 10 milligrams may be given daily

Ascorbic acid may be given in doses of 50 milligrams 3 times a day or, if it is shown that absorption is defective, in doses of 500 milligrams intramuscularly once every 7–14 days

If there is evidence of osteoporosis, rickets or tetany, particularly with coeliac [illegible] Calcium

[illegible]

given daily

complete, but it may lead to extensive narrowing of the bowel or to one or more ring fibrous strictures of the bowel causing intestinal obstruction for which surgical treatment is obviously necessary.

Medical treatment

available

THE SPRUE SYNDROME

An idiopathic failure of fat absorption, the sprue syndrome occurs in tropical

With the failure of fat assimilation, there is loss of weight and energy, intestinal distension and flatulence, and the stools become bulky, offensive and frequent

The calcium in the diet is immobilized as calcium stearate and, in long standing cases there may be tetany and osteoporosis The absorption of the fat soluble vitamins is impaired, night blindness (vitamin A deficiency) and a haemorrhagic tendency (vitamin K deficiency) may occur and the failure of absorption of vitamin D adds further to the defect in the calcium metabolism There is also impairment of

or hyperchromic from interference with the absorption of the haemopoietic factor There is no failure of pancreatic secretion, proteins are digested and there is, therefore no excess of nitrogen in the stools as occurs when pancreatitis causes steatorrhoea

TREATMENT

The essentials of treatment include initial rest in bed a high protein low fat diet the addition of vitamin supplements and crude liver extract and folic acid Folic acid reduces the diarrhoea in the majority of cases and thus allows a more liberal diet to be given than was formerly possible

In any case of moderate severity and in all serious cases systemic penicillin should

may be used

Local treatment in mild and moderate cases is with a hydrogen peroxide mouthwash, 10 volumes per cent diluted with an equal quantity of warm water In addition a simple mouthwash may be prescribed such as Glycerinum Thymolis Compositum (*B P C*) A painful or chronic aphthous ulcer may be touched with a silver nitrate stick, but this should not be repeated more than once In severe *cases frequent rinsing of the mouth with warm normal saline solution is advised* The mucous membranes of the mouth and gums are very tender and more harm

treatment should be prescribed

tion or strain, or one of these The patient should abstain from tobacco smoking

stilboestrol, 1 milligram taken 4 or 5 times in each week

ULCERATIVE COLITIS

in bed for several months In more severe cases medical treatment may be unsuccessful and surgery will be necessary In the most severe cases, some of which run an acute course, the disease is uncontrollable and ends fatally.

DIAGNOSIS

On account of the severity of the disease, the length of treatment involved and the uncertainty as to its outcome, every effort has to be made at the outset to establish the diagnosis [illegible] The diagnosis is actually made by sigmoidoscopy, because t[illegible] pelvic colon is not involved, [illegible] barium enema x ray examination is required to exclude carcinoma of the colon and non-malignant stricture due to the healing of severe chronic ulcerative colitis An x-ray

Additional sodium chloride should be given particularly if there is excessive diarrhoea Skimmed milk may have 1 5 grammes per pint added to it and orange juice and lemon juice may be fortified by 0 3–0 45 gramme per 100 millilitres A daily intake of 15 grammes should be aimed at and this means that about 10 grammes should be supplied as weak saline solution drinks

AFTER CARE AND PROGNOSIS

Each patient needs individual consideration The prognosis is excellent with tropical sprue and complete recovery may occur In others, some dietetic care is needed It is probable that idiopathic steatorrhoea does not fully recover and will require a general reduction of activity, restriction of fat in the diet and the continued administration of folic acid and crude liver extract, which should always be combined when given over long periods

F AVERY JONES

STOMATITIS

Stomatitis may be catarrhal aphthous, herpetic, ulcerative or gangrenous It may be parasitic, due to thrush The severe grades are associated with an intercurrent disease such as agranulocytosis, acute leukaemia, uraemia, and the terminal stages of tuberculosis, carcinoma, and other wasting diseases It may complicate acute specific fevers, especially measles Simple catarrhal stomatitis may be due to local causes such as dental caries, tartar or badly fitting dentures It may be due to the administration of certain drugs, such as iodides, mercury, bismuth, gold and arsenic Aphthous ulceration may be idiopathic, or it may be associated with debility from prolonged fever or nervous strain, with dyspepsia, or it may be cyclical with menstruation Stomatitis, catarrhal or ulcerative, occurs in pellagra and sprue, a severe gingivitis is a feature of scurvy Stomatitis, particularly gingivitis, may occur in epidemic form, as happened in World War I when it was known as trench mouth, it occurred to a lesser extent in World War II

The differential diagnoses to be borne in mind are diphtheritic ulceration carcinoma, syphilis and, rarely, tuberculosis, also herpes simplex and certain skin diseases of which the more important are lichen planus, lupus erythematosus and pemphigus

TREATMENT

The treatment of stomatitis is in the first place on an aetiological basis An accurate diagnosis must be made, and in any case of even moderate severity the examination must include a complete blood count and careful inquiry as to the possibility of a vitamin-deficiency state

In the second place a pathogenic infection should be looked for, because even [illegible]

Penicillin itself may cause stomatitis and should not be given for more than 3 days

remove or at least diminish the fear which fills his mind When the treatment is under way and when there is some improvement inquiry is made as to the patient s environment particularly with regard to difficult situations with a high emotional content in which he may be or may have been placed Personal contacts of a diffi cult or impossible nature seem to be so often a factor in the causation of ulcerative colitis that whether or not they are initially known to the medical practitioner it is generally best to arrange for the patient s treatment in a hospital or nursing home that it to say away from home Conversation between medical practitioner and patient provides an opportunity for the patient to talk about his difficulties and this in itself may be an important contribution to recovery Further the practi tioner may be able to help the patient to a decision or possibly to offer advice which provides the way out of a dilemma

Rest in Bed

1

Food and Fluid

The too rapid passage of food and food products through the intestinal tract interferes with assimilation The frequent evacuation of loose stools leads to dehy dration and salt depletion Add to these conditions the toxaemia of the disease and perhaps continued fever and the anaemic wasted state of the individual with ulcer ative colitis is amply accounted for The objective is a liberal diet of high-calorie content rich in proteins with super abundance of vitamins and some restriction of residue-containing foods A high-calorie content requires a sufficiency of fat because a patient with ulcerative colitis cannot digest large quantities of carbohydrate If there

required On the b
patient weighing 9

patient Lactose 3 ounces a day which is less sweet than glucose may be given in fruit juices and should be made up in 2 pints of fruit juices each day It is very important to keep up the protein intake The following using Prosol protein milk may be convenient methods of keeping up the protein intake

	grammes C	P	F
10 oz milk	12	10	10
1 oz half-cream dr ed milk	11	7 5	4
1 oz. lactose	30	—	—
1½ oz Prosol (Trufood)	12	28	—
		45 5	

examination may show the extent of the disease or its complication by polyposis An examination of the stools is made to exclude amoebic infection and bilharziasis A blood count may show anaemia, which is a common feature of the disease It is a wise precaution to make a radiological examination of the lungs and to examine the faeces for tubercle bacilli In very severe cases a seepage of infection leads to a low grade peritonitis, actual perforation may occur

Today, less attention is concentrated on the treatment of the bowel and more consideration is given to the individual as a whole, particularly in regard to the psychosomatic aspect of the disease, and to establishing the state of nutrition at a high level

EMOTIONAL CONDITION OF THE PATIENT

creates a state of anxiety which may aggravate the intestinal unrest

There seems to be a type of personality common to subjects of functional gastro-intestinal disorders which predisposes to ulcerative colitis The subjects of ulcerative colitis are worrying individuals, without an outlet for their emotions They cannot get their troubles off their minds either by 'having a row' or by other means They are meticulously tidy in their habits and so high-principled and scrupulous in behaviour that they expose themselves to more emotional strain than does the average individual even in living a normal life In addition there may be an abnormal dependence on one parent and an immaturity of emotional development

autonomic system and over stimulation of the gut

Recent work by Grace, Seaton Wolf and Wolff (1949) has shown that the emotional state may be reflected in the lysozyme content of the stools, if excessive,

GENERAL MANAGEMENT

Reassurance

The first step in the treatment of such a patient is to give him sure hope of recovery, to give him courage by strengthening his confidence in himself and, by these means, as well as by a careful and detailed treatment of his symptoms, to

Tomato, vanilla, coffee or Bourn-Vita may be used for flavouring If a low-fat feed is necessary, skimmed milk and skimmed dried milk may be used

Soups should be enriched thus

	grammes C	P	F.
10 oz. soup			
1 oz. Prosol	8	19	—
½ oz. soya bean flour	1 9	5 8	3 4
		24 8	

Bemax contains 30 per cent protein and is another useful source *It is advisable to* give vitamin supplements such as the following ascorbic acid, 200 milligrams daily (50-milligram tablets), thiamine hydrochloride, 10–30 milligrams, nicotinamide, 150–300 milligrams (50-milligram tablets), riboflavine, 6–12 milligrams, vitamin A, 25,000–50,000 i u, and vitamin D, 4,000–8,000 i u (Adexolin capsules contain vitamin A, 6,000 i u and vitamin D, 1,000 i u Radiostoleum capsules each contain vitamin A, 6,000 i u and vitamin D, 1,200 i u)

These vitamins should be given in divided doses 3 or 4 times daily

In some cases it may be worth trying a milk-free diet for a short time as a milk sensitivity may develop and cause an exacerbation of symptoms

With continued diarrhoea, sodium deficiency may develop and this can be prevented by maintaining an intake of 5–10 grammes of sodium chloride daily and by making certain by the Fantus test that the urine contains chloride

TREATMENT

Symptomatic

Diarrhoea

Bismuth salicylate 30 grains 3 or 4 times daily, is generally given with codeine *phosphate, ¼–½ grain In more severe cases* tincture of opium, 5–7½ minims, is given instead of codeine phosphate If the diarrhoea is not brought under some measure of control by treatment on these lines, a starch and opium enema may be given

Abdominal pain

Tincture of belladonna, 5–7½ minims, 3 or 4 times daily, is given by mouth for the relief of colic It is given in combination with codeine phosphate or tincture of opium Sometimes intravenous injection of 5 millilitres of 5 per cent calcium chloride may relieve pain from enterospasm

Anaemia

Every effort should be made to maintain the haemoglobin level at 80 per cent or over Fersolate Tablets, 3 grains, given 3 times daily after food is the simplest remedy Iron by mouth is often ineffective and it may increase the diarrhoea Blood transfusion is the most effective remedy in severe ulcerative colitis with a haemoglobin level of 75 per cent or under *It is better to give 1–2 pints of fresh*

SAMPLE HIGH CALORIE AND HIGH PROTEIN DIET (SUBJECT TO MODIFICATION)

Time	Food	Weight in ounces	Content in grammes			Calories
			Protein	Fat	Carbo-hydrate	
On awakening	Tea					
	Biscuit	1	2	3	20	129
Breakfast	Porridge, oatmeal or Cereal	⅓	1 3	0 9	5 8	41
	with Milk (fresh)	6	5 4	6 6	7 8	114
	Bemax	½	4 5	–	8 5	52
	Bacon (back fried)	1	7	15 2	–	169
	or Fish (haddock)	1 7	7	0 34	–	30
	or Egg (poached)	2	7	6 6	–	90
	Bread	2½	6	1 5	33	195
	Butter or Margarine					
Mid morning	Biscuit	1	2	3	20	129
	Milk	4	3 5	4 4	5	76
Dinner	Meat (beefsteak grilled)	4	30	24 5		344
	or Fish	6	30	3	–	156
	Potatoes	5	2	–	28	125
	Vegetables (good helping, not celery, peas or beans)	–	–	–	–	10
	Milk pudding	5	5 5	7 4	25	205
	Fruit *Purée* or Sponge pudding, steamed or baked	2	–	–	5	20
Tea	Milk for tea	2	2	2 2	2 6	39
	Bread	2½	6	1 5	33	195
	Butter (including break-fast)	1	0 1	24 2	–	226
	Jam	½	–	–	10	40
	Plain cake	1½	4	3	23	138
Supper	Meat (beefsteak grilled)	4	30	24 5	–	344
	or Fish	6	30	3	–	156
	or Cheese	4	30	19 2	–	308
	Bread	2½	6	1 5	33	195
	Milk	5	5	5 5	7 0	95
	Vegetables (not celery, peas or beans)	–	–	–	–	10
Bedtime	Milk	4	3 5	4 4	5	76
	Biscuit	1	2	3	20	129
Totals			127	136	278	3096

Biscuits	3 oz	Butter	1 oz
Bemax	½ oz	Fish	6 oz.
Bread	7½ oz.	Potato	5 oz.
Milk	21 oz.	Plain cake	1½ oz.
Bacon	1 oz	Cheese	4 oz.
Meat	4 oz	Green vegetables	2 good helpings
Oatmeal	⅓ oz	Jam	½ oz.
Milk pudding	5 oz	Fruit *Purée*	2 oz.

SURGICAL

Ileostomy

The indications for ileostomy are the severity of the disease, failure to respond to medical treatment, and fibrosis with cicatricial contraction of the wall of the colon, due to healing of the disease, causing obstruction The inconvenience of having an ileostomy has, in the past, led to this operation sometimes being post poned until too late, when the patient it too ill to recover The use of a Rutzen ileostomy bag has greatly reduced the inconvenience of an ileostomy so that in the future this will be the operation of choice Its use is admirably described by Hardy, Brooke and Hawkins (1949) Colectomy is indicated if the patient remains ill and toxic and when a troublesome anal discharge persists in spite of an ileostomy It is also indicated in severe cases of polyposis, and when there is any question of malig nant disease

CONVALESCENCE

The period of convalescence is long and may be expected to extend from 1 to 3 years With increasing strength and activity the patient must always live well within the limits of his physical and emotional resources This will involve extra rest, reduced hours of work and early retirement at night A highly nutritious diet with additional vitamin supply is advised Fruit is somewhat restricted and un cooked vegetables and salads are withheld until recovery is complete A teetotal régime is advised Relapses, which are not uncommon, should be treated immedi

pelvic colon or of the rectal type, and over fatigue, physical or emotional

F AVERY JONES
GEOFFREY EVANS

Grace, W J, Seton, P H, Wolf, S, and Wolff H G (1949) *Amer J med Sci*, 217, 241
Hardy, T L, Brooke B N, and Hawkins, C F (1949) *Lancet*, 2 5
Lockhart Mummery, J P (1943) *Med Pr*, 209, 103

blood by a slow drip rather than by massive single transfusions Intravenous iron (Ferrivenin) may be of value (Page 68)

Insomnia

Sleeplessness is treated with the usual sedatives but the use of barbiturates can often be avoided and with advantage by giving tincture of opium at bedtime with syrup of chloral 60–90 minims if necessary

Constipation

Paradoxically constipation may be a feature of ulcerative colitis and there is evidence that pelvic colon constipation may aggravate or even determine a sig mo ditis It is important to secure complete emptying of the rectum and pelvic

stool This condition is best dealt with by running 4 fluid ounces of paraffin oil into the rectum at bedtime and washing out the lower bowel with tap water at a tem

SPECIAL

Intestinal antiseptics

Intestinal antiseptics should be given a trial because they may reduce the tem perature in a febrile case and they may reduce the number of stools and improve the patient s sense of well being A usual plan of treatment consists of the intra muscular injection of penicill n 200 000 units 8 hourly for 10 days and one of the sulphonamides given by mouth for 5 days namely sulphathiazole 1 gramme 4-hourly or Sulphasucc dine 1 5–2 grammes 6-hourly or phthalylsulphathaladine, 1 gramme 8 hourly

Desiccated Ileum

A preparation of desiccated ileum Parvestin of which the dose is one teaspoonful daily has been favourably reported on

LOCAL

Lockhart Mummery (1943) advises a 5 or 10 per cent suspension of bismuth subgallate in olive oil or cotton seed oil Eight ounces to a pint of the oil at body temperature is run into the rectum with a small rubber tube and funnel with the

"The old ought *not* to be withdrawn from the world of the living so far as possible they should continue to share in the joys and sorrows of the community " In so far as contraction of interest in the affairs of others and a failure to adjust to changing circumstances are criteria of old age, then it is obvious that there are many individuals who do not reach old age until they have lived for 80 years or more

Occupation

It is important to preserve every scrap of mental or physical activity in old age Immobility leads to stagnation in body and mind, hastening early decay Senescence needs more stimulation than soothing if atrophy is to be retarded Hence regular exercise, occupation and domestic activity should always be encouraged Such pursuits as gardening, carpentry, rug making and a game of bowls from time to time, keep the mind as well as the body alert The wireless, books and newspapers can play their part by maintaining touch with current affairs, but worth while work is of course, best It is the old person who has forgotten how to concentrate his attention on something outside himself who is most difficult, also an abrupt transition from active business to complete retirement often leads to early death

Personal Hygiene

Certain habits, common to old people, may need modification Dislike of fresh air, a tendency to wear too many clothes and take too few baths are habits which should be corrected Regular daily exercise in the open air is undoubtedly good unless the weather is bad It is the old man who sits huddled over the fire, wearing

of similar people in a cool one, as was found by experiment at St John's Hospital Battersea This explains why old folk are so sensitive to draughts and sudden changes of atmosphere As to baths, the aged may become lax in their standards of cleanliness It is important to insist on regular baths at least once or twice a week

Food and Drink

mi

the

Obesity overworks the heart and overloads the knees and so promotes hypertensive heart disease and osteoarthritis When the weight is reduced other symptoms will

a fat

these

Alcohol

When, however, we consider the use of alcohol, the problem is not so simple Most heavy drinkers have died before reaching old age, those who remain have, in Cheyne's words " an original constitution of brass" (Cheyne, 1725) Although a policy of abstinence may be theoretically desirable it is unwise to make radical alterations in the drinking habits of an elderly person Whisky can act as a valuable sedative It can be useful both as a night-cap and also to combat the depression of

GERIATRICS

INTRODUCTION

In 20 years from now, 20 per cent of the population in Great Britain will be over

man who meets all sides of the problem every speciality in medicine has some contribution to make to the subject

THE HEALTHY AGED

Psychology

restricted outlook, focused on the immediate requirements, buttressed by habit, and dreading change, must always be taken into account by those who have to care for old people Fussing, pampering or bullying tend to make the aged confused and helpless Patience, cheerfulness and a little individual attention will usually evoke a spirit of co operation which can achieve wonders In many ways old folk are like children They love the limelight and will often do strange things to gain the notice which they feel is due to them Hence it is important to keep a proper sense of proportion when listening to their complaints Anything tending to encourage self pity must be avoided and sympathy should be given only in small doses The frequent recital of sorrows to nurse or doctor must be checked since these sorrows if frequently repeated, gradually grow in the mind of the patient

Habits

risk of some mental confusion At the Royal Hospital, Chelsea, it was found that those pensioners who were admitted before the age of 70 years settled down to the routine much better than older recruits They also tended to live longer and to remain more robust Old people should therefore be encouraged to enter a home or hostel while they still retain some powers of adaptation Otherwise, if they have to leave their own homes, the change is sometimes too perplexing for them at a time of life when adjustments are difficult

On the other hand these involutionary changes can be largely prevented if old people are able to continue to take an active part in life Vischer (1947) writes

procaine into the tender spot often gives relief If more than this amount is injected

lactic acid 0 2 per cent with procaine 2 per cent buffered to *pH 5 2–5 4)* into and around the affected joints once a week In order to obtain maximum benefit from the injection it is important that the joint should be put through its full range of movement within 10 minutes of the injection, since it diminishes pain and increases mobility This form of treatment can be employed when the patient is up and about

THE AGED SICK

New Growths

New growths often progress slowly and give rise to few symptoms at first When the diagnosis is made, however, the doctor is confronted with the problem guide the practitioner on this blood sedimentation rate and a high sedimentation rate indicate a poor prognosis

Surgery

damage if this is allowed to continue even for a few minutes It is therefore advisable to administer oxygen as part of any general anaesthetic Much may be done with safety under a local anaesthetic This is probably the best anaesthetic for operation on strangulated hernia, for instance, in a chesty old person While the aged often stand up to abdominal surgery quite well any interference with the thorax is less well tolerated They do not seem to be good subjects for induction of an artificial pneumothorax in pulmonary tuberculosis On the other hand, the results of Tanner (1943) in the radical treatment of carcinoma of the oesophagus are very promising Orthopaedic procedures, such as manipulation under a general anaesthetic, are

Cardiovascular Disease

often result It should be borne in mind that moderate degrees of hypertension are well borne by old people They do not necessarily shorten life and are compatible with reasonable activity In old age a wider variation in heart rate, that is to say a

those with inoperable new growths An old person usually has found the routine of life which suits him best and to tamper with this is often unsafe After all it is a short step between health and sickness in old age

THE INFIRM

Organic Disease

A large number of elderly persons are in a state which is intermediate between health and sickness This is known as infirmity Some of these merely suffer from physical weakness others have a definite complaint such as arthritis which limits their activity or they may be afraid to go about because they are subject to gid diness or definite attacks of vertigo A few may have had minor cerebral vascular accidents On the other hand more serious organic disease in old people may be insidious in onset and relatively symptomless The medical practitioner therefore in dealing with old people should always have in mind the possibility of anaemia subnutrition and carcinoma especially of the bronchus stomach and rectum an enlarged prostate a chronic urinary infection and myocardial disease perhaps due to a silent coronary thrombosis are easily overlooked Nevertheless old people often respond surprisingly well to treatment based on the accurate diagnosis of their case

Cerebral Thrombosis

The onset of infirmity may sometimes arise from minor cerebral thromboses When these occur it is important that the patient should be kept in bed for as short a time as possible Immobilization may lead to permanent invalidism and even to the formation of contractures of the lower extremit es If these patients are en couraged to move the affected limbs from the onset it helps recovery The doctor needs to exercise great patience and persistence in keeping his patient active Such

The result of keeping patients in bed too long may be seen too often in our chronic wards Stiffness and contractures in such cases are far easier to prevent than to cure When the infirmities of old age are concerned prevention of complications must always be the doctor s main concern

Minor Maladies

Cough mixtures should be made unpalatable because they tend to be habit forming

Bronchial catarrh

In many cases of bronchial catarrh there is an element of bronchial spasm This applies especially to subjects in whom there is a past history, or family history, of asthma The simplest, and on occasion most useful, remedy is

Potassium iodide	10 gr	600 mg
Aromatic spirit of ammonia	15 min	1 ml
Peppermint water to	½ fl oz.	15 ml

This should be given in water at bedtime, alternatively ephedrine hydrochloride given in doses of ¼–½ grain may be effective, or a mixture containing iodide, ephedrine and caffeine may be given 3 times daily with water before meals The following is such a mixture

Ephedrine hydrochloride	¼–½ gr	15–30 mg
Dilute hydriodic acid	10 min	0 6 ml
Sodium iodide	3 gr	200 mg
Caffeine (alkaloid)	2½ gr	150 mg.

The medical practitioner should be aware of idiosyncrasies to these drugs Iodide may cause headache congestion of the nose and para nasal sinuses, and catarrh Ephedrine may cause tightness of the chest, palpitations sleeplessness and dis turbances of micturition Antihistamine drugs may be useful, namely Benadryl 50 milligrams given by mouth Refractory cases are treated with adrenaline hydrochloride (1 1 000) given intramuscularly in doses of 3–5 minims, alternatively [illegible] Adrenal [illegible] Physical methods of treatment may be of value namely [illegible] wave diathermy A course of [illegible] spasm and the improvement may last some months

Pulmonary oedema due to congestive heart failure in the aged may simulate or complicate chronic bronchitis It is important to recognize pulmonary oedema because it may respond well to treatment with mercurial diuretics

Acute bronchitis

Patients with chronic bronchitis may be subject to acute or subacute exacerba tions of their bronchial infection or the exacerbation may be due to an acute infec tion of the upper respiratory tract *These infections may be aborted or mitigated at their onset by rest in bed and treatment with a sulphonamide or penicillin*

PNEUMONIA

The diagnosis of pneumonia in an old person is often difficult It may be accom panied by little or no fever and a resting heart rate in old age up to 90 per minute is compatible with health The onset of pneumonia is recognized by an increase of

range of between 50 and 90 per minute may be compatible with normal senile

call for active treatment

people differs little from the standard treatment

Respiratory Infections

Chronic bronchitis

The commonest disease of the respiratory system in old people is chronic bronchitis Its treatment is often unsatisfactory partly because of an underlying element of subclinical congestive heart failure Some of the expectorant drugs commonly used do not increase the amount of sputum as has been shown by the observations of Alstead and confirmed by the writer In particular ammonium chloride ammonium carbonate and ipecacuanha often diminish the amount of expectoration

taken first thing in the morning and last thing at night is a simple and effective expectorant The Brompton Hospital mixture is the best remedy for a dry irritating cough the mixture is dispensed as follows

Sodium bicarbonate	20 gr	1 2 g
Sodium chloride	3 gr	200 mg
Emulsion of chloroform	5 min	0 3 ml
Distilled anise water to	½ fl oz.	15 ml

In troublesome cases Linctus Diamorphinae (*B P C*) 30–60 minims (60 minims

following mixture with water at bedtime

Sodium bromide	10 gr	600 mg
Sodium bicarbonate	10 gr	600 mg.
Spirit of chloroform	5 min	0 3 ml
Anise water to	½ flu oz.	15 ml

Slowly effort is increased and outside aids, such as sticks, are given up At the same time more varied occupations are encouraged. A patient who can get about is encouraged to lay the table, arrange flowers and do other minor domestic tasks Physical activity stimulates mental improvement Small excursions to other rooms

CONCLUSION

It will be seen, therefore, that the treatment of disease in aged subjects justifies a sanguine outlook In acute illness prompt action is called for In the chronic complaints improvement is only achieved by patience and perseverance The time factor is important in the practice of geriatrics A case of chronic arthritis may not start to show improvement until several months have passed A hemiplegic patient may

tion of the arms takes precedence

Among the therapeutic methods available to the physician some of the most useful are the physical ones, and physical medicine is invaluable to the geriatric physician Many of the minor aches and pains of the aged can be soothed by some form of heat Arthritis and sacro-iliac pain *can be helped by short-wave diathermy* Improvement can be produced in a hemiplegic limb by faradic stimulation of the

opine

with

Finally it is emphasized that each old person is a law unto himself in chronic diseases, especially, a line of treatment which is successful in one patient may be ineffective with another It is necessary to give personal care and attention to each patient if good results are to be obtained.

T. H HOWELL

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Cheyne, G (1925) *An essay of health and* London.

URINARY INCONTINENCE

Incontinence of urine is one of the most common and most difficult symptoms to deal with in old age The best approach is that of Wilson (1947) He has found that bladder contractions, which are normally inhibited by the cerebral cortex, have escaped from this control Hence micturition is initiated only by the local spinal reflex, which functions at relatively low levels of distension of the bladder The awareness of desire to pass water is often impaired in such patients, so that contractions of the bladder can take place without any stimulus reaching consciousness Under these conditions the muscle fibres of the bladder tend to become shortened, so that the viscus is never properly filled, while there is always residual urine In the presence of infection, senile vaginitis or an enlarged prostate, the irritability of the reflex is increased Hence uninhibited contractions occur which can be demonstrated on a manometer, showing variations in bladder pressure Figs 28 and 29 compare the normal curve with that found in an incontinent patient

For successful treatment of this condition therefore, several methods of approach are necessary First, the bladder must be emptied regularly every 3 hours, whether the patient has involuntarily passed urine or not This disposes of the residual urine Secondly, any local condition must be diagnosed and treated Infections of the urinary tract are treated with one of the sulphonamides or penicillin, and senile vaginitis with stilboestrol Thirdly, general rehabilitation must be undertaken in order to re-establish cortical control of the bladder Many patients who are incontinent while leading a "vegetable" existence in bed, regain control of micturition when up and about

The most important part of treatment, however, is the re-education of the bladder This is done by means of the cystometer (Fig 30) which is used for the diagnosis and treatment of urinary incontinence It consists of a raised reservoir containing saline, the rate of outflow of which is controlled at 80 drops a minute by a screw clamp similar to that of a drip saline apparatus The fluid passes into a Woulfe's bottle displacing a[illegible] into a second Wo[illegible]lfe's bottle conta[illegible] 1,000 [illegible]

to the catheter It may be conveniently attached to the stand supporting the reservoir While the bladder is being filled with the solution, the level of the fluid in the manometer must be watched Any contraction produces a temporary rise of pressure, somet[illegible] 100 [illegible]

REMEDIAL TREATMENT

The intractable dermatitis produced by organic compounds of arsenic improves in a few days with inunctions of 5 per cent BAL ointment Daily applications

cleaning of the dermatitis as when the inflamed areas themselves were treated it is only to be expected that the use of BAL by injection will be equally effective (*see* Acute Mercurial Poisoning page 791) (Longcope and his colleagues 1946)

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BENZENE POISONING

Benzene poisoning arises from constant slow inhalation of the vapour of this solvent The bone marrow is attacked with resulting thrombocytopenia, leukopenia and severe anaemia Death occurs from true aplastic anaemia

TREATMENT

The prolonged inhalation of any concentration of benzene is dangerous but

lation and its characteristic odour in a workshop should be regarded as a danger signal No patient who has suffered from poisoning should return to work involving exposure to benzene Patients with chronic poisoning should be treated by repeated blood transfusions since the toxic influence may persist even after removal from exposure The response to treatment is poor

NITROBENZENE POISONING

Nitrobenzene is an oily liquid which is rapidly absorbed through the skin It acts on the blood converting haemoglobin to methaemoglobin

TREATMENT

For reasons of health it is necessary in the manufacture of nitrobenzene to use closed apparatus Transport as well as the emptying of receptacles should be effected either by the use of compressed air or by aspiration Good natural ventilation should be provided and in hot weather this must be artificially reinforced Floors should be impermeable and not made of asphalt or tar because these materials absorb the toxic substance The workman should be provided with

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DERMATITIS OF OCCUPATIONAL ORIGIN

Countless substances from lubricating oils to paraphenylenediamine may cause dermatitis It is important to remember that a worker may be exposed to alkali at the kitchen sink at home as well as at the factory bench The early diagnosis of occupational dermatitis is of the utmost importance, so that the employee may be removed from contact with the causative agent Any other course may lead to intractable skin disease associated with sensitivity to many agents

Treatment

Selection of employees by pre employment examination, repeated medical inspection and prompt first aid treatment are measures of importance in reducing the incidence of occupational dermatitis Employees and supervisors should be instructed in the nature of the hazards encountered during work, in cleanly methods of work, and in the care of the skin Increasing attention to factory hygiene, and particularly to plant design, are of vital importance so that the chances may be reduced of irritant materials coming in contact with the skin

Provision of protective clothing and carefully chosen barrier creams are import ant but less satisfactory preventive measures and, although they are often necessary, they should not be relied on alone unless it is impossible to reduce the hazard by improvement of plant design Adequate washing facilities are essential in factories in which irritant materials are used, and it is necessary to stress their strict super- vision when once such facilities are provided The correct application of barrier substances and the institution of washing facilities make it possible to eliminate irritant cleansing agents which themselves often cause skin disease

Early removal from contact with the irritant substance and protection of the inflamed skin are cardinal principles in treatment The benefits of rest and hospital treatment for severe cases are very marked It is wise to seek the opinion of an experienced dermatologist at an early stage in severe or doubtful cases In some cases x-ray treatment is a most valuable therapeutic agent

HYDROGEN CYANIDE POISONING

Cyanide poisoning is a form of asphyxia caused by the arrest of internal respira tion The cyanide ion acts on the respiratory ferments of tissue cells, incapacitating them in such a way as to prevent their taking up oxygen Cyanide poisoning

Although large doses are fatal within a few minutes cases have been reported in which death has been delayed for 3 hours In such cases, so long as the heart con tinues to beat, prompt treatment may save life

Treatment

Cyanide poisoning needs specific treatment which must be given rapidly if it is to prove effective It is therefore fortunate that the "oil of bitter almonds" odour of the breath associated with asphyxia is diagnostic The objective in treatment is to

suitable clothing, and this should be changed so often that it does not become unduly impregnated with nitrobenzene. Gloves are necessary and should be frequently changed and cleaned Cloak-rooms, washing-rooms, and baths are essential Workmen should be instructed as to the care of any victim of an accident in which

times be within easy reach.

DINITROBENZENE POISONING

Dinitrobenzene is a solid substance, slightly yellow in colour, used as an explosive If it contaminates the skin of men who shovel it or melt it the lilac cyanosis of methaemoglobinaemia occurs

TREATMENT

In building a factory which is to be perfect from both technical and hygienic points of view it is important that doors, windows, walls, partitions, and platforms

substance. All flooring should be even and made of an impermeable material These arrangements may fail in the summer and on windless days, when the heat is oppressive On such days it is not uncommon to see the whole personnel of a dinitrobenzene factory affected with slight cyanosis

There must be a constant campaign against careless and dirty habits Working garments, gloves, and boots must be changed and cleaned regularly as soon as soiled by the poisonous product Cloak-rooms and baths must be provided and

ordinary amounts. On account of the frequency of subacute and chronic poisoning strict medical supervision is of great importance.

CARBON MONOXIDE POISONING

impracticable to use wet methods, and it is therefore necessary to adopt machinery designed to minimize dust

In the potteries removal of dust by locally applied exhaust ventilation has accomplished much in the diminution of poisoning So also has the use of low solubility glaze or frit, a substance introduced by Thorpe (1901) It is a product in [illegible]

effect of using a non dusty substitute can readily be imagined

Since 1927 it has been illegal for a painter to rub down by dry methods any indoor structure previously treated with lead paint Dust can be avoided by using a damp rubbing down process for lead painted surfaces Waxed sandpaper which the workman dips repeatedly in a bucket of water has made this possible (Klein, 1923) At the present time a painter in mixing paint is rarely exposed to dry white lead since it comes to him already mixed in oil

Paint technologists have invented a non setting red lead, which is now issued to the painter of metals already mixed in oil He is therefore protected from exposure to the dust of red lead for he no longer mixes the materials himself The use of plastic rubber, that is rubber in which litharge has been incorporated in a mother batch to the extent of 90 per cent, has abolished the production of lead dust in certain processes in the rubber industry (Klein, 1922)

In addition to cleanliness in the workplaces, personal cleanliness is of the first importance Cloak rooms, washing rooms, mess rooms, baths, nail brushes towels, and soap must be provided The hands should always be washed before eating, and the work people urged to take a warm bath frequently Food and drink must not be brought into the workrooms and smoking at work must not be allowed Medical examination of the workers must be carried out periodically At present we have no biological test by which to select workmen who are immune to the toxic effects of lead Since pregnant women and all persons under 18 years of age have been found unduly susceptible, it is necessary to forbid their employment in the potteries and other lead trades

In the prevention of lead poisoning a diet of high calcium content plays its part for it assists the storage of lead in a harmless form in the bones Workmen should be provided free of cost with a glass of milk each morning They should also drink plenty of water which will help to prevent constipation and often make the use of aperients unnecessary Any worker who develops one of the toxic effects of lead has thereby proved his susceptibility, and ideally he should never again work in any department of a lead works

CURATIVE

Curative treatment of lead poisoning is based upon the observation that a high calcium diet causes lead excretion rapidly to diminish A diet containing 4 pints of milk a day or a daily dose of 15 grammes of calcium lactate is all that is necessary to store lead in the bones so that it will not be free in the circulation to cause harm

In cases of lead poisoning showing toxic symptoms the diet should contain 3 pints of milk daily, and include milk puddings, junket, and ice-cream, together with

The best agent to use for the formation of
his is 7 times as effective as methylene blue

A dose of 0 5 gramme of sodium nitrite dissolved in 15 millilitres of water is

practitioner reaches the scene before death he has no time to do anything for the patient In cases of poisoning by inhalation subcutaneous or even intravenous treatment is too slow to be effective The patient should receive an immediate inhalation of amyl nitrite Glass capsules of this substance should be on hand and their contents are liberated by breaking one or more into a handkerchief which is then held over the patient s face while manual artificial respiration is applied (Henderson and Haggard 1943)

LEAD POISONING

Lead poisoning arises from the inhalation of dust and fume It gives rise to constipation colic muscle palsy low colour index anaemia with punctate basophilia and rarely to encephalopathy

TREATMENT

Preventive

In Great Britain preventive measures are carried out with such success that the

success has been achieved by the institution of protective measures over which the worker concerned can exercise no control One such method is exhaust ventilation applied through hoods at the source of origin of dust or fume The hygiene of the workshop and cleanliness of the worker are both important Benches tools

machinery should be substituted for hand carriage

White lead is made by the stack process and leaves the stack as an aqueous paste to be mixed with linseed oil and made into an oil paste in closed automatic machines without dry grinding In the manufacture of litharge and red lead it is

Since it would doubtless require several years, it is useless to attempt the elimination of all the lead stored in the body It is desirable to eliminate only the most readily mobilized lead In prolonged observations the results *indicate that after a* certain point elimination of lead becomes progressively more difficult When this [illegible] -ain- [illegible] ium [illegible] mal diet and abundance of milk to correct the calcium deficiency Treatment to accelerate elimination should then begin again Ammonium chloride should never be used *in the presence of nephritis or of toxic symptoms Should any toxic episode* appear during the use of ammonium chloride it must be stopped and a high calcium diet at once used to favour the storage of lead

It is necessary to emphasize the difference between the use of agents which assist excretion of lead and those which assist its storage The acidosis method of lead elimination is so potent that its use during colic or any other toxic episode might prove fatal from the further mobilization of lead It is scarcely necessary to add that such treatment should never be used as an excuse for negligence in enforcing all the known measures for the prevention of exposure and absorption

[illegible]

MERCURIAL POISONING

Mercurial poisoning occurs from exposure to the vapour of metallic mercury and the dust of its compounds It gives rise to salivation, sore gums, loss of teeth and even necrosis of the jaw Tremor and erethism may occur

TREATMENT

PREVENTIVE

In the manufacture of clinical thermometers and in laboratories in which mercury is handled extensively, the benches should be covered with a smooth and impervious surface sloping in such a way as to drain the mercury into a suitable receptacle at the lowest point The walls and floors should be of impervious material and the floor should be cleansed at the end of each day's work Thermometers *should not be filled without suitable exhaust ventilation for the* removal of mercury vapour Overalls, mess rooms, and washing facilities should be provided The mouth and pharynx should be frequently rinsed with a mouthwash and the teeth cleaned with a soft tooth brush and a dentifrice Periodical medical and dental examination can achieve a great deal, especially by emphasis on the proper hygiene of the mouth Cavities in carious teeth should be filled, sharp angles smoothed, and useless teeth extracted (Legge, 1934)

butter, cheese, and eggs In the presence of acute symptoms no attempt shoul made to increase the elimination of lead, so much is already circulating that safer to encourage further storage The first step should be to prescribe large qu tities of calcium lactate, 5 grammes (75 grains) 3 times a day When the calci intake is sufficient most of the lead is stored in the bones, and the patient loses symptoms

Colic

Colic should be treated by the local application of heat, pressure, and moistur It is desirable that the bowels should be moved as early as possible by means o enemas of olive oil and warm water In his study of untreated lead colic, Tanquere des Planches (1839) found that it may persist for from 4 to 12 days or more Brouardel (1904) stated that colic usually yields to treatment within 8 days, but that if neglected it may continue for 2, 5, or even 6 weeks Treatment with a high calcium diet almost invariably brings relief within 2 days (Aub and his colleagues, 1925)

The relief of lead colic by calcium therapy involves more than the ability of calcium to favour storage of lead Since the pain is due to violent peristalsis behind a contracted tonic ring of intestine, the anti spasmodic effect of calcium salts on involuntary muscle is beneficial In severe cases it is possible, by the slow intraven ous injection of 15 millilitres of a 20 per cent solution of calcium glucon 10 millilitres of a 5 per cent solution of calcium chlorid time the injection is over The pat ent s effect upon the pa n necessary, be availabl

Lead palsy

During th evelopment of lead palsy a high calcium diet should be used to favour the storage of lead Massage and electrical treatment also may be used In the early stages the hands, when affected by wrist-drop, should be supported on splints

Lead encephalopathy should be treated by lumbar puncture, and a high calcium diet

Elimination of lead

A few weeks after the acute toxic episodes have passed the elimination of lead may be accelerated by the use of a low calcium diet, together with ammonium hloride, to facilitate the release of lead from the bones All milk milk products, reen vegetables, and eggs are omitted from the diet which may, however, contain neat, liver, chicken, potato peas, rice apple, tomato, banana, lemon, tea, coffee, igar, honey, salt and pepper All bread should be prepared without milk It is tter to substitute vegetable fat for butter In those places where the water supply hard, vegetables should be cooked in distilled water and all drinks made up with it Ammonium chloride is administered cautiously in doses of 1 gramme (15 grains) en in a glass of water 8 or 10 times daily for 3 weeks at a time The dose should educed if loss of appetite and headache appear, for these symptoms indicate the t of tolerance to such treatment

NITROGEN DIOXIDE ("NITROUS FUMES") POISONING

Most cases of nitrogen dioxide poisoning occur in the manufacture of nitric and sulphuric acids and of nitro-compounds and nitrates Nitrogen dioxide is evolved when nitric acid is spilled during handling or storage It has most treacherous and *insidious qualities*, and but for the distinctive red-brown colour of the fumes and for the education of the worker, more fatalities would occur The margin of safety

TREATMENT

Measures must be taken to prevent the escape of fumes and to remove them as nearly as possible to the point of origin by localized exhaust ventilation Danger *must be reduced to a minimum by special efforts to get rid of fumes before repairs* to dangerous plant are attempted Approved types of breathing apparatus must be provided and maintained for use when fumes are noted or apprehended

When any reddish fumes can be seen, smelt, or appreciated by the conjunctiva or throat there is serious and imminent danger All workers, except those properly protected, should be removed from the dangerous area immediately Spilt nitric acid should be hosed away with large quantities of water by men wearing efficient breathing apparatus

In patients seen soon after exposure it may be difficult to decide how much risk has been run *In such cases the patients, in spite of protestations that they are now* better and able to carry on, should be kept under observation and at rest for 24 hours Other persons with or without symptoms known to have been seriously exposed should be removed to hospital lying flat Absolute rest is essential, oxygen should be administered as early as possible and continuously, except for the last

other means which will ensure maximal efficiency The rate of flow should be 3–10 litres per minute, the necessary amount being judged by the effect produced Venesection of patients with purple cyanosis and a full pulse may give much relief to an overloaded right heart but this is contra indicated in patients with pallor or grey leaden cyanosis, thin pulse, and pulse rate over 100 Rest, oxygen *early and continuously, and venesection when indicated are the three essentials of treatment*

NUCLEAR FISSION INJURIES

The use of chain reacting piles involves *risks of injury by radiation infinitely* greater than those already experienced in minor degree from the handling of radium The sources of radiation may no longer be expressed in millicuries but in hundreds and thousands of curies Nuclear energy may affect the body in the form of *beta*-rays, *gamma* rays or neutrons Damage from *beta*-rays is limited to the skin Neutrons and *gamma* rays may give rise to granulocytopenia, thrombocytopenia,

ventilation and spotless cleanliness must be introduced in such shops These measures may not eliminate all risks for after the carrotted fur has left the furriers' workshops it goes through further processes known as blowing forming hardening sizing blocking shaping crown and brim ironing planking proofing stoving and pressing In Great Britain preventive measures have reduced the number of cases of poisoning to negligible proportions but there are still many such cases in Italy Russia has abolished the use of mercury and has substituted a potash method for the felting of fur, but this produces felt of inferior quality A harmless substitute for nitrate of mercury has been introduced into the industry in the United States of America (Beal McGregor and Harvey 1941)

CURATIVE

Acute mercurial poisoning (non industrial)

Mercuric chloride (mercury perchloride) or some other soluble compound of mercury may be swallowed by accident or for purposes of suicide or homicide A dose of 0 5 gramme of mercuric chloride by mouth is rarely fatal but 1 5 gramme often results in death There is burning epigastric pain vomiting abdominal cramps and sometimes tenesmus with bloody watery diarrhoea Albuminuria and leukocytosis occur In some cases there is collapse with shock dehydration and haemoconcentration

If used in time certain monothiols and dithiols reverse the toxic action of mer curic chloride Thus animal experiments show that therapy with 2 3 dimercapto propanol (British AntiLewisite or BAL) can completely prevent the necrotizing action of mercuric chloride on the renal tubules (Ginzler, 1946)

Immediately the patient is seen the stomach should be washed out with 4 000 millilitres of 5 per cent sodium formaldehyde sulphoxylate and 300 milligrams of a 10 per cent solution of BAL in benzyl benzoate and arachis oil injected intramus cularly This treatment must be followed within the first 12 hours by 2 or even 3 further injections each of 150 milligrams of BAL Subsequently a daily injection of 150 milligrams of BAL is given for 2 or 3 days according to the general condition of the patient When there is shock with haemoconcentration it is necessary to use in travenous infusions of physiological salt solution with 5 per cent glucose Blood

3-7 days Treatment with BAL has reduced the mortality rate of acute mercurial poisoning from 32 per cent to 4 per cent

DONALD HUNTER

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Ginzler A M (1946) *Fed Proc* 5 221
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Longcope W T and Luetscher, J A (1946) *J clin Invest*, **25** 557

interval of some hours without symptoms may end with the sudde
pulmonary oedema accompanied by profound circulatory collapse

TREATMENT

Preventive

In industrial establishments where phosgene is prepared or ha
must be taken to prevent the escape of the gas from closed appa
piping. Exhaust plant must be installed for the withdrawal of fum
and adequate ventilation is essential For emergency
air should be

ashed, and the m
es of phosgene d
saliva from causing irritation of the

Curative

Any person who has inhaled phosgene should be put to bed at ab
kept under observation for 24 hours If symptoms have not deve
hours they are unlikely to arise subsequently. Since circulatory coll
phosgene poisoning complete rest is essential from the
and clothing should

drinks sweetened with glucose.

If pulmonary oedema develops, treatment of the anoxia
most urgent need As long as any degree of anoxia exists, continuo
efficient method must be maintained. Such tre
oxide m
circu
often occurs simultaneously,
d a
pulse. Venesection is indicated in this type of circulatory failure
(Coramine) is a useful stimulant but efficient oxygen therapy is mo
Vomiting always occurs and much of the fluid from the lungs may
Atropine is not effective, expectorants should not be given
that the patient is

dangerous
centres. Restless
f temperature af

aplastic anaemia, sterilization, and possibly genetic injuries which may be manifest in future generations Chronic exposure to radioactive dusts involves a potential risk of cancer

TREATMENT

Protection must be provided for the workers in factories and laboratories, and for the community near by Dry waste is usually disposed of by deep underground burial Liquid waste in small quantities may be disposed of also by burial, but larger quantities must be diluted or decontaminated sufficiently to allow discharge into nearby streams in a concentration which will not be harmful The inspection and supervision of workers is best accomplished by a special ' health physics" team to cover all phases of a works' research and production organization employing 1,500 persons, this might require a team of 70 workers

Pocket, badge and special meters can be used to detect the amount of radiation received by workers They are termed personnel monitoring meters Mobile instruments are used to test radiation from sources, or contamination of various sites and objects such as floors walls and desks Stationary instruments such as integrons and monitrons are used to measure and record general background radiation levels They may be connected to an alarm system to sound a warning when a given radiation level has been reached Barriers are always necessary, and in large installations like piles, they may be massive concrete walls 3–8 feet thick Distance is the best barrier, but it is often necessary to use concrete and lead for walls, doors, movable blocks and bricks to protect against *beta* rays and *gamma*-rays and to use water or paraffin to stop neutrons Rope barriers and danger notices may be used in danger areas Ventilation is important in order to prevent air borne contamination becoming lethal Protective clothing is valuable, and facilities for laundering must be provided Special soaps and chemical substances are required to remove plutonium

Despite all these safeguards some persons will be exposed to dangerous amounts of radiation It must be remembered that the highly trained scientist takes the most

risk of further absorption A person exposed to neutrons may have induced radioactive elements in his body when active sodium and potassium are readily detectable in the urine

Burns and other injuries require first aid treatment and may need hospital treat ment Repeated blood transfusions must be used for aplastic anaemia (*see* page 78)

Chen K K Rose, C L, and Clowes G H (1934) *Amer J med Sci*, 188 767
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PHOSGENE POISONING

Phosgene (carbonyl chloride) is used in the chemical industry and as a war gas In low concentrations it causes little irritation of the upper respiratory tract so that dangerous amounts may be inhaled before its presence is recognized An

TREATMENT

In mining operations in which hard rock is encountered, ample dilution of the air in the mine with fresh air is the simplest method of reducing the dust concentration Various forms of ventilation are in use Drilling with pneumatic hammer drills is responsible for much dust but usually wet drilling can be employed The method used consists of hollow drill steels through which a continuous spray of water passes When wet drilling proves impossible or objectionable, foam drilling equipment can be used By means of compressed air, a thick foam is forced through the drill steel from a closed vessel The foam traps the dust completely and the amount of water used is only about a gallon per hour *Several efficient dust traps for use in* dry drilling are now available The dust is removed from the vicinity of the mouth of the bore hole to a fabric filter by means of a vigorous air current induced by an ejector situated in the filter container and worked by compressed air After shot *firing a mist projector is used to allay dust It is really an atomizer using compressed* air and spraying a mixture of castor oil and water in which the proportion of oil to water is about 1 in 100

In the grinding trades, sandstone wheels should be abolished and replaced by wheels made of harmless synthetic abrasives such as Carborundum (silicon carbide) and corundum (aluminium oxide) It is known both by animal experiment and clinical observation that the dusts from these two chemical substances do not produce silicosis When sandstone wheels are still used, the operations of rodding and hacking as well as the actual grinding of metals must be carried out under a continuous stream of water which is drawn away from a trough at the base of the rotating grindstone In the industries using refractory materials siliceous dust must be exhausted through hoods placed as near as possible to the source of origin

In foundries, steel and other metals are poured red hot into sand moulds and it follows that the final castings are partly covered with sand and therefore can produce dust when treated with particular tools Fettling (steel-dressing) implies the use of a compressed air chisel to clean up a casting Locally applied exhaust ventilation must be used in such an occupation When castings and other metal objects are cleaned by sand blasting the man wears a special dress so arranged that he breathes pure air from outside the sand blasting cabinet It is better either to use *shot-blasting in which crushed ball bearings replace sand* or to employ powdered Carborundum The hydro-blast is both the most modern and the safest apparatus used to clean castings A high velocity jet of sand and water is projected on to castings thereby removing moulding material cores and scale The velocity of the water as it leaves the hydro *blast gun is in excess of 3 miles per minute*

In the manufacture of pottery, powdered alumina which is harmless should universally replace powdered flint Suitable exhaust ventilation should be arranged to take the dust away from the potter s wheel

In the asbestos trades good general ventilation and especially locally applied exhaust ventilation must be used in the factories and on the machines The carding machine is the chief offender When it is stripped the dust must be sucked away from the teeth of the rollers with a brush fitted with a cover and connected to a vacuum cleaner

drugs in full dosage should begin immediately Convalescence is slow, and effort syndrome commonly follows an incident of gassing Patients with an abnormal pulse rate should not be allowed up too soon Rehabilitation under medical supervision assists in avoiding neurosis as a sequel to phosgene poisoning

RADIOACTIVE SUBSTANCES INJURIES

Persons preparing and handling radium for therapeutic purposes may be inadequately protected. In the case of people who carry radium about, the weight of the lead they can bear to carry only partly protects them. In industry, a hazard is attached to the use of mesothorium in luminous paints These paints are applied to the figures and hands of watches and to certain important parts of the machinery of aeroplanes. Exposure to the paints gives rise to granulocytopenia, thrombocytopenia, aplastic anaemia, sterilization, necrosis of the jaw, spontaneous fractures and sarcoma of bone

TREATMENT

is necessary. In routine blood examinations, leucopenia, granulocytopenia or thrombocytopenia call for a change of occupation in the worker concerned. The hands must be repeatedly inspected for dermatitis Workers must wear photographic films sensitive to *beta* and *gamma* rays, and the radon appearing in the expired air must be repeatedly measured

Like lead, radium has been shown to be stored largely in the bones. A course of treatment with ammonium chloride and a low calcium diet may prove successful in reducing the amount of retained radium as indicated by the amount of radon in the expired air. Repeated blood transfusions must be used for aplastic anaemia (*see* page 78).

SILICOSIS

It is now clear that silica damages the lungs by chemical action through slow solution, and not mechanically The smaller particles are the more dangerous, partly because of their more rapid solubility Silicosis is a man-made disease It cannot arise from exposure to sand storms in deserts because the particles of desert sand are too big. Of the siliceous dusts produced by modern machines, it is the particles below 5 microns which are dangerous In the lungs of men who have died of silicosis, the most representative particle is about a micron in size In mines and

ment examination and at regular intervals later

INFECTIOUS DISEASES

ACUTE

INTRODUCTION

PREVENTION AND CONTROL OF ACUTE INFECTIOUS DISEASES

GENERAL SURVEY

"The best form of treatment is prevention" If to this axiom is added, "or if this is impracticable, postponement or attenuation of attack", the aim and trend of

great epidemic scourges of history, notably cholera, plague, typhoid and typhus fevers and smallpox, have been virtually banished from civilized communities while common diseases once dreaded with just cause, such as diphtheria septic scarlet fever and puerperal fever, have been reduced alike in prevalence and severity to trivial dimensions How much credit there is to deliberate prophylaxis, to improved living conditions or to changes in the host-parasite relationship, may be difficult to determine with accuracy, even with the aid of modern statistical techniques The favourable trend was abruptly interrupted by two World Wars both

... the ncidence of cerebrospinal

ons) but

influenza

nore dis

turbing in its social and economic consequences, had no such epidemiological counterpart The poliomyelitis epidemics of 1946 in the United States of America and of 1947 in Great Britain and the European continent had little obvious relation to war conditions In both World Wars smallpox was kept under control by a combination of vigilant surveillance at ports and airfields, selective vaccination of *known contacts and mass vaccination of Service personnel On the whole,* having taken the lead in the sanitary reform necessitated by the environmental conse

pitfalls

BACTERIOLOGICAL ERA

Although Davaine had identified the causative organism of anthrax in splenic fever in cattle as early as 1864, bacteriology begins with Pasteur (1822–95) who was a professor of chemistry, not of medicine and studied disease in wine insects and *domestic animals before turning to man Vaccines to combat chicken cholera,* splenic fever and rabies followed each other in rapid succession Koch, after discovering the organism of tuberculosis went to India in search of material to

TRINITROTOLUENE POISONING

Trinitrotoluene (T.N.T.) is a yellow solid. The main route of absorption is through the skin, but ingestion of the substance and absorption of dust and fume ... ommonest effects of T.N.T. ... aundice from acute necrosis

TREATMENT

...

medical examination, ventilation, and clean working conditions were the chief. Success was not achieved until mechanical means were substituted for the hand carriage of shells, combined with measures of cleanliness which were so precise as to prevent the contamination of the outside of the shells by T.N.T.

Unfortunately, in 1939, hand contact became widespread. In filling factories T.N.T. is used either molten, powdered, or in pellets known as biscuit. In the preparation of amatol and baratol, in filling shells, bombs, and mines, and in the breaking of biscuit, both contact with the skin and the production of dust are inevitable. In these processes further dangers are involved because solid T.N.T. is spilled on the benches and it adheres to stemming rods, pouring cans, and funnels. Also, the cleaning of these tools and the shops themselves, unless done properly and under supervision, very often entails worse contact than the filling itself (Swanston, 1942). Fume hazard occurs where T.N.T. is melted and where shells and anti-tank ...

bohydrate content with a low fat content.

In many factories the conditions need to be improved by better ventilation, especially local dust extraction, and by the provision of better tools and the intro- ...

Bridge (1942) summarizes the principles for the prevention of T.N.T. illness as cleanliness of the air breathed, secured by effective ventilation or, if that is impossible, filtration through an effective respirator, cleanliness of the implements used and the cleanliness of the person, secured by protective clothing and by personal attention to the skin.

DONALD HUNTER

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Himsworth, H. P., and Glynn, L. E. (1942) *Clin. Sci.*, 4, 421.
Legge, T. M. (1917) *Proc. R. Soc. Med.*, 10, 1.
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existence Attendance at hospital out patient departments and at clinics and, in the lower income classes, at day nurseries, overcrowding in the home and enforced residence in nurseries as a result of divorce, illegitimacy or maternal illness, all tend to offset the early advantages Residential nurseries, some ill-constructed and poorly equipped, and handicapped with reduced or imperfectly trained staffs, have been increasingly incriminated, but maternity departments and nursing homes have been far from blame free in spreading dangerous neonatal and infantile infections

with calf lymph or rabbit lymph is advis
ab incision of ⅛–⅙ inch long, or the newer
mi whereby with 25–30 separate pressures
with a Hagedorn needle or with the blade of a lancet, the lymph is pressed into the superficial layers of the epidermis over an area of ⅛ inch diameter This technique is no less effective and is probably less liable to local complications but has no advantage in respect of diminution of pain over other methods If the mother has been successfully vaccinated within 5 years the vaccination is unlikely to be sucess

precipitated vaccine) should be given Glaxo and Parke, Davis & Co make suitable preparations which can be purchased direct or procured through the clinics conducted under the National Health Service by county councils or county boroughs *Dosage and times of administration vary according to the mode of* manufacture and the instructions given in the leaflet enclosed in each package should be carefully followed Generally speaking a course consists of some 50 Lf (limit of flocculation) doses or units of diphtheria antigen and 40 000 million pertussis organisms, it may consist of 2 injections only if the first is free from reaction, generally 3 doses, of equal or increasing size, for example 0 5, 0 5 1 0 millilitre, are given intramuscularly into the vastus externus at intervals of 4 weeks Makers supply the mixture in vials for practitioners or rubber-capped bottles for clinics If the antigens are supplied in the same containers, Merthiolate 1 10 000 or a like substance rather than phenol must be used as a disinfectant because phenol interferes with the potency of the diphtheria antigen A purified toxid (P A P T) is avai
aluminium phosphate,
reactions reduced Im
formerly possible, and increasing co operation on the part of parents secures the

mmended
lation for
operly be
ients is a

From 6 to 12 months—The three forms of immunization detailed above should be given at this age if they were postponed for any reason such as prematurity or ill health At this period most babies lose their complete protection against common infectious diseases such as scarlet fever and measles attack, should it occur, is

investigate cholera, to South Africa for rinderpest and to Java for malaria second only to Pasteur in elucidating the fundamental problems involve association of pathogens and their hosts Credit for the brilliant therapeuti antitoxin in diphtheria is largely due to Behring (1854–1917) following the is of toxin by Yersin and Roux, unfortunately no subsequent antitoxin has comparable results in any disease just as to date no antibiotic has appro penicillin in all-round efficacy The present century has been characterize attempts to exploit the fundamental discoveries of these workers and to ex the ranges of knowledge chiefly by investigating viruses, rickettsial bodies (mid between bacteria and viruses) and bacteriophages Advantage was taken of known bactericidal properties of heat, chemicals and ultra violet rays to supp ment the natural processes of dilution dispersion and lytic activity of a wide rang of organisms including moulds, together with selective inoculation of subject particularly exposed to risk The design was ambitious and, despite setbacks, on the whole promising, especially as presented in a brilliant series of reports by Newsholme and Newman for the Local Government Board and Ministry of Health, respectively, which assumed the inevitability of medical progress and abolition of disease, and laid the foundations of social medicine as a scientific study

ADVENT OF ANTIBIOTICS

Despite the solid advances recorded in public health and in immunology, alike affecting the individual and the group, certain black spots remained to remind workers that anything like finality had not been approached, far less reached. The concept of immunization as a dynamic process depending on a number of variables, many still outside our knowledge or control, allowed no relaxation in the effort to maintain the critical level of immunity, on the whole, man appeared to be winning the battle, but the sudden emergence of post infective encephalitis and homologous serum jaundice, or of epidemic influenza, infantile gastro-enteritis, poliomyelitis and puerperal sepsis shattered his hopes at intervals Even at quiet times, infections of burns or simple operations or the occurrence of respiratory infections tended to be high in hospitals, often of the order of 20 per cent even under favourable conditions Against this uneasy background two specific chemotherapeutic substances, sulphonamide and penicillin, were produced and their ffectiveness was demonstrated in 1936 and 1940, respectively Since that time many dvances have been recorded but the complexity of bacterial structure and metaolism and their apparent versatility under the most adverse conditions continue create problems requiring ever new antibiotics to combat them These will be sidered in connexion with individual diseases

FIC PROPHYLAXIS

s convenient to detail the measures available in chronological order, although nces in social class, country or special circumstances may determine the lar order, time, interval or frequency of their application (Parish 1948)

ime

0–6 *months* —With the exceptions of staphylococcal skin infections, gastro- and to a less degree whooping-cough, the young infant enjoys a relat derived from maternal antibodies and from his compara

diphtheria and whooping-cough antigens, preferably 1 0 millilitre, is advisable immediately before starting school

From 16 years upwards—There are no special epidemiological risks associated with puberty and adolescence At the same time entrance into crowded offices and factories or attendance at cinemas and dance halls may entail peculiar hazards and problems as does the increasing occupation of married women especially of pregnant women, in industry Special categories of workers, especially nurses and medical students, may with advantage be inoculated against scarlet fever, a satisfactory modification of Dick toxin has not been discovered and dilutions of unaltered toxin may cause considerable reactions in highly susceptible subjects For these the *oral route may be employed as an alternative, but enormous doses* are required to effect a Dick test conversion Common cold, febrile catarrh, influ enza, bronchitis, tonsillitis and some forms of rheumatism, although not scheduled

influenza, with or without bacterial additions, autogenous or not, may be tried, combined with modifications of conditions of work and dietary if indicated Autogenous vaccines against boils have been almost completely supplanted by penicillin therapy

War time

Revaccination and inoculation against typhoid fever and tetanus form the routine measures of prophylaxis in war time, but as even adult civilians may be ordered abroad at short notice the recommendations under the following heading (Abroad) may with advantage be carried out in whole or in part Combined tetanus Welchii and oedematiens toxoids are still in the experimental stage

Abroad

Additional measures are required for civil and Service personnel likely to proceed overseas Cholera plague Shiga dysentery, typhus fever (exanthematous, murine and scrub) and yellow fever are the main diseases against which it is desirable to confer active immunity In particular areas it may be advisable to use the measure against Flexner dysentery, Malta fever, tularaemia and Weil's disease Vaccines are disappointing inapplicable or still in the experimental stage in the prevention of pneumoccocal and pneumobacillary pneumonia meningococcal meningitis anthrax, tuberculosis (with Tuberculin T or P P D) streptococcal invasions including recurrent erysipelas, salmonella infections, measles and poliomyelitis

ENVIRONMENTAL AND SOCIAL MEDICINE

No useful purpose is gained by reiterating in detail the reforms which constitute

... added that the

... ment of floors with

bedsteads and fabrics, are left untreated Impregnation of fabrics with suitable

typically mitigated by the partial or residual immunity which usually lapses completely in the last few weeks of [illegible]

[illegible]

stream Sickly children exposed to measles or scarlet fever should receive passive immunization to postpone attack to a more opportune time Those not already immunized against diphtheria and whooping cough should be similarly protected [illegible] h horse immune serum and the latter [illegible] The antigens and antitoxic sera may [illegible] affecting the issue as regards final degree of active immunity

From 1 to 5 years—As the child may now abandon his relatively sheltered existence and become a [illegible]

[illegible]

combined inoculum, in any event an undetected lapse of immunity may occur at [illegible]

[illegible]

Immune measles serum (convalescent or *gamma* globulin) should be given for protection or attenuation, preferably the latter, according to circumstances In the first 5 days of exposure 0 2 millilitre of the former and 1 5 millilitres of the latter per pound of body weight usually protects and after that time attenuates, some saving is effected by giving a somewhat smaller dose up to 50 per cent, in the earlier period should attenuation be desired The time is hardly ripe for deliberate exposure followed by immune serum to confer the benefits of attenuation in view of the incidental risks, but there are many advantages in having measles over before going to school Healthy subjects should therefore not be shielded from attack and this is even more necessary in regard to rubella, chicken pox and mumps, which may entail much economic loss at a later period of life Convalescent serum can be used to prevent these three diseases, but generally speaking any advantages are more than offset by the risk, the appropriate dose is from 2 to 3 times the dosage scheme recommended for measles Poliomyelitis serum likewise may be used in particular circumstances, but the exposure–attack ratio is so low that many experienced authorities discourage its use There is a natural if dangerous, temptation to divide children's infections into categories according to whether they are (1) inevitable and therefore should be contracted if possible before entering school, and (2) occasional and attempts may therefore be made to evade them, and further into (a) desirable such as development of the tuberculin sensitive state without disease, and (b) undesirable, such as paralytic poliomyelitis The non paralytic form is [illegible]

[illegible]

affection, should receive the benefits of attenuation The hazard homologous serum jaundice against which there is no certain safeguard is too serious to warrant indiscriminate administration of human serum A reinforcing dose of combined

Parish, H J (1948) *Bacterial and Virus Diseases* Edinburgh, Livingstone
Mole, R H (1947) *Lancet*, 1, 597

ANTHRAX

DEFINITION AND INCIDENCE

Anthrax is primarily a disease of animals, chiefly of herbivores, and only occasionally is transmitted to man when the risk of exposure is great, as in meat and hide porters, farm workers, those engaged in wool, brush and artificial manure industries, and in veterinary surgeons The incidence in animals in Great Britain is low, the usual order of frequency being cattle, sheep, pigs and lastly horses, elephants are very liable Four human cases occurred in attendants at the London Zoo in 1938, the condition was contracted from elephants which died suddenly and they proved, on post mortem examination, to have been suffering from anthrax The disease is rare in dogs, cats, rabbits, guinea pigs, rats and mice, while birds, fish, reptiles and insects are immune, although they may act as vectors of infection

ANTHRAX IN MAN

The disease in man assumes two forms, cutaneous anthrax and pneumonia (wool sorters' disease) Cutaneous anthrax is usually called the malignant pustule, the organism gains entrance through a sore or abrasion, or through sweat and sebaceous glands, or may even be rubbed through the intact surface Formerly from 20 to 25 per cent of patients died, but early intensive chemotherapy should reduce case mortality to less than 5 per cent

The mode of infection in wool sorters' disease is by contaminated dust and parts of fabric The onset is insidious and the progress of the disease is rapid, and almost invariably fatal

PROPHYLAXIS

Animals

In endemic countries immunization is commonly practised by the method of Pasteur, or of Cienkowsky, or by Sobernheim's combined active and passive method for susceptible animals Animals dying of anthrax should be buried intact in quicklime at a depth of 6 feet or burned, if possible at the dying site, to avoid contaminating the grasslands

Man

The best measure is disinfection of wool, hair, hides, carcasses and bone meal, conveniently carried out at the port of arrival (in Great Britain at the Government Disinfecting Station at Liverpool) Known contacts may be injected intramuscularly with 10 millilitres of Sclavo's serum which protects for 10–14 days Active immunization is too dangerous for so rare a disease

TREATMENT

Restorative

As for any grave toxaemia complicated by vomiting and restlessness, replenishment of fluids, saline solution or Ringer lactate solution with 5 per cent glucose, by

antibacterial oils such as technical white oil, with emulsifying agents or with phenyl mercuric compounds is expensive in materials and labour, while effective disinfection of atmospheres with dry or wet aerosols, whether propylene glycol, hypochlorites or quaternary ammonium or with ultra-violet radiation, is seriously

apples may be openly polished with the positive spit of the tuberculous barrow

such as the Advisory Council on Building Research and Development of the

as fluorosis, but epidermophytosis, plantar warts and scabies still abound even in favoured social groups. Example is worth much precept, but the ever-mounting cost of administration tends to thwart honest endeavour at improvement Rules and

showed in recent years, the policy of selective vaccination and surveillance in place of quarantine, although by no means foolproof, has time and again been amply vindicated

International co-operation in the prevention of infectious diseases has proved a friendly bond between nations whose interests otherwise might be expected to clash Various regulations for the control of these diseases were consolidated in the Port Sanitary Regulations of 1933, with Amended Regulations issued in 1945, implementing the recommendations and agreements of the International Sanitary

and pleasant, but the demand for recreation and relaxation at all ages tends to leave sickness and old age to look after themselves. Geriatrics has displaced paediatrics as the most pressing aspect of the study of man

TREATMENT

Individual diseases are most conveniently considered in alphabetical order in the remainder of this section, although this arrangement necessarily entails the association of widely diverse conditions

As happens in other lung conditions, antibiotics are often given with favourable effect even though the true nature of the disease is at first unrecognized Antibiotics may fail to reach the pulmonary secretions in high concentration and *should therefore be given in addition by inhalation every 6–8 hours* Suitable forms of atomizing apparatus are Collison, Deedon and Phantomyser, activated either by oxygen or by an electric motor.

COMPLICATIONS

Although septicaemia is common it responds well to chemotherapy and hardly affects the prognosis Patients may live long enough to develop pulmonary abscess gangrene, broncho pleural fistula or empyema, requiring appropriate surgical treatment Multiple cutaneous abscesses and boils may likewise rarely require surgical intervention The usual anti-shock measures, warmth, oxygen and plasma, are given routinely for toxaemia together with other measures detailed under restorative therapy

AFTER-CARE

Once the toxaemia has been neutralized recovery is swift and uneventful The local lesion resolves slowly and should receive the minimum of attention in the way of dressings In the disposal of the dressings the most rigid care is necessary by burning everything even remotely connected with the wound as quickly as possible, or alternatively sterilizing by the autoclave, mere boiling may not destroy the spores

Ellingson, H V, Kadnee, P J, Bookwalter, H L, and Howe, C (1946) *J Amer med Ass*, 131, 1105

CEREBROSPINAL FEVER

DEFINITION

Cerebrospinal fever (meningococcal meningitis or spotted fever) is an acute infectious disease occurring in all parts of the world in sporadic, subepidemic and ... and characterized patho- ... the brain and ... ints and other tissues

HISTORICAL NOTE

... but was ... given by ... epidemic ... America, ... 1854–74 in the greater part of ... out- ... –10 ... orld ... , in- ... reat Britain was four times greater in World War II but as the case fatality was reduced to approximately one quarter, the general mortality for the two Wars was about the same

the intravenous route in severe cases is imperative Anorexia may lead to protein depletion requiring plasma or to anaemia requiring fresh blood The needed

LOCAL

Local treatment formerly meant surgery either scraping or total excision but such interference is withheld nowadays Local rest by bandaging or splinting if necessary helps by promoting sleep and probably arrests the tendency to spread into the blood stream Doubt has been expressed about the value of local antiseptics although naturally penicillin powder and solutions have been used As a number of organisms some of which may produce penicillinase may be present some stable bactericidal agent such as 2 per cent phenoxetol or 1 5 per cent Dibromopropamidine is an advantage antibiotics with inhibitory activity may be too unstable or may induce drug resistance in the organisms concerned If these substances are not available 1 per cent aqueous solution of gentian violet is preferable to carbolic or mercuric preparations formerly much in vogue

SPECIFIC

bacterici
It is best
s 50-100

CHEMOTHERAPEUTIC

Most workers nowadays feel able to dispense with serum except for the severest forms in the light of the known satisfactory response to penicillin Whether sulphonamides should be combined is controversial in the presence of mixed infection and when the therapeutic response is tardy or unsatisfactory full doses of Sulphatriad 9 grammes per day at 6 hourly intervals and 250 000 units or more aqueous penicillin at intervals of 4–6 hours should be given as resolution takes place the penicillin intervals can be widened or the aqueous form replaced by a suspension with procaine 1 per cent in arachis oil once a day Ellingson and his co workers (1946) emphasized that the local lesion does not resolve more quickly than when the drug is withheld in fact the morbid process actually progresses for a few days by virtue of a tissue damaging factor elaborated by the anthrax bacillus which has been experimentally isolated from cultures of the organism

PULMONARY FORM

Even more intensive therapy is needed for woolsorters disease which remains highly fatal Often the condition is not recognized until necropsy but the early use of antibiotics preferably in combination or with sulphonamides to combat any Gram negative or penicillin resistant Gram positive organisms may turn the tide

difficulty may be a real one especially as rashes are less frequent in the young, but bronchiolitis, pneumonia and otitis media may confuse and occasionally complicate Eruptions may mislead, especially the so-called chronic (better termed recur

rigors and sweating but without eruption may simulate abortus fever, while pains in joints, tendons and muscles may suggest rheumatic fever The presence of polymorphonuclear leucocytosis should indicate blood culture which, however, may

syndrome, and haemorrhagic measles occasionally imitate meningococcal invasions

Meningitic stage

Mild, usually transient meningitic features (meningism) may appear before actual invasion of the meninges, at this stage only lumbar puncture will clinch the

rhage, tumour or encephalitis may imitate meningitis very closely

PROPHYLAXIS

Three stages of prevention are considered and are given below

Avoidance

Avoidance of the factors which have been proved to favour spread remains the chief weapon, these factors are overcrowding, especially in sleeping quarters fatigue, thirst, starvation and, above all, concurrent respiratory infections which

they have acute or chronic catarrh or the meningococcus is known to be prevalent

Detection of carriers

The detection, supervision and disinfection of proved carriers and of contacts always an unrewarding task, has been considerably lightened but not by any means solved by chemoprophylaxis While it is easy to eliminate organisms from

events Masks have an undetermined sphere of usefulness mainly reserved for

CLASSIFICATION

The numerous clinical forms and the various complications and sequelae render classification far from easy

I The ordinary type —This constitutes some 90 per cent of the total, in approximately one-third a cutaneous rash appears In recent years group I organisms have been isolated in about 90 per cent of all cases, there is a special tendency for [illegible]

[illegible]

Vomiting, collapse, coma and low blood pressure should suggest the presence of this syndrome, but diabetes mellitus, cardiac and cerebral accidents and blood diseases may need to be excluded

III Post-basic form —Although rare under 3 months of age meningococcal meningitis is common in the first year, especially in a subacute or chronic form long known as post-basic meningitis, characterized by marked head retraction and later by opisthotonos and emaciation

IV Chronic form —Although any attack, especially of the post-basic type, may become chronic with development of serious complications and sequelae, the designation chronic is commonly limited to a group, originally described by Rolleston in 1919, in which intermittent fever may subside spontaneously or recur at intervals, or end in meningitis, or even follow meningitis with localization of the focus in the meninges or blood stream These types have been more fully described by Stott and Copeman (1940) in reference to World War II.

V. Mild or abortive forms —The frequency of these attacks depends on the [illegible]

VI Rare forms, complications and sequelae —These are mentioned under treatment to avoid needless repetition

DIFFERENTIAL DIAGNOSIS

The disease is characteristically protean in its clinical manifestations and in the sporadic form may be difficult to detect early, bacteraemic and meningitic stages are usually recognizable but they may be concurrent and indistinguishable in their effects Banks (1948) has therefore suggested the term *meningococcosis* to include all the clinical and latent guises in which the infection may present itself.

Early stage

The early stage, with or without a rash, is infrequent (5–10 per cent) in sporadic forms but is frequent (50–75 per cent) in epidemic forms Subacute nasopharyngitis heralds the onset in about one-quarter to one-third of cases and may mislead the clinician into diagnosing influenza or like febrile infection. In children the

globulins or by extraction of the gamma fraction safeguards the potency of the product and the well being of the patient At the same time the osmotic properties of immune sera may serve to combat shock which is a feature of severe attacks If serum is given, the intravenous route only should be used as meningeal reactions and aseptic meningitis may follow intrathecal administration The dose should be large, 50–100 millilitres and repeated in 12–24 hours if required

Chemotherapy

The balance of evidence favours sulphonamides as the drugs of choice although in special cases combination with penicillin may prove necessary as is usual for pneumococcal meningitis The author s preference is for a combination of sulphonamide such as

adequate dru

fluid (about

single drugs sulphadiazine is probably the best although some workers retain a

age should receive ¼ the adult dose, between 4 and 10 years ½ the adult dose and between 11 and 15 years ¾ of the adult dose, particular care being taken to give adequate amounts of fluid and to keep the urine alkaline For severe attacks the initial dose should be given intravenously and continued by this route in cases of coma

...scular injections of some

speaking administra

s a definite increased

...of the same ... when plasma is added

ere

free

from organisms In routine practice it is not necessary to repeat the lumbar puncture until cessation of treatment, unless a relapse occurs (in some 2–3 per cent of cases) due to persistence of organisms often walled off by purulent adhesions The course of a sulphonamide drug may be repeated penicillin may be substituted or *both drugs may be used depending on the age of the patient response to the initial* course and presence of adhesions especially of block at the foramen magnum as revealed by the Queckenstedt test with absence of rise in the fluid pressure when the jugular veins are compressed

Penicillin therapy is marred by the uncertainty with which the drug passes the blood brain barrier both in health and inflammatory states For septicaemic states penicillin is adequate in doses of 250 000 units every 4–6 hours for 4–5 days but with the onset of meningitis its use is rarely indicated as even pure crystalline penicillin tends to cause reactions in the meninges, whether the potassium salt is better than the calcium or sodium salts in this respect has not yet been established Penicillin is commonly reserved for cases with block and may be given by the *lumbar, cisternal or intraventricular routes (with a Purves Stewart drill)* using well diluted solutions not more than 5,000 units per millilitre and preferably more dilute solution if the bulk of fluid can be accommodated in the cavity under treatment By the time this stage is reached meningeal reactions are less likely to occur

situations in which infection is prevalent and the danger to subjects at special risk necessitates its use, sometimes as a placebo

Active immunization

TREATMENT

RESTORATIVE

In the great majority of ordinary cases the metabolic disorder caused by invasion is readily corrected by administration of nutrient fluids by mouth, at first mostly of sugar solutions flavoured with fruit juices according to taste In coma or protracted vomiting the intravenous route is required preferably normal saline solution with 5 per cent glucose, supplemented by human plasma when water depletion has been rectified to maintain the optimum osmotic balance of the body fluids, it is given generally in the proportion of 1 part plasma to 4 parts of electrolyte solution The total amount depends on the body-weight degree of dehydration current loss and the amounts taken by mouth as consciousness is regained but a minimum of 5 pints a day is advisable for adults Attacks marked by much diarrhoea are best treated [illegible]

in body fluids and cells may be forestalled The current practice of choosing human plasma (which is or may be without specific antibodies) in preference to horse sera (containing pre-formed antitoxic or antibacterial substances) appears at first sight to be illogical but the risk of giving heterologous sera especially to comatose subjects is felt to outweigh any advantage accruing from their possible specific effects The hazard of homologous serum jaundice may be countered by substituting an anti shock substance such as dextran (Thorsén, 1949) and antihistamine drugs such as Anthisan may be used for horse serum disease

SYMPTOMATIC

Restlessness and insomnia must be treated actively with phenobarbitone, chloral hydrate or bromides singly or in combination For severe cases of excitement paraldehyde or hyoscine may be required Headache may be intense and may be relieved but is sometimes aggravated by lumbar puncture, it usually responds to 10 grains of Compound Tablets of Codeine (*B P*) or 50–100 milligrams of pethidine In stuporose states retention of urine should be carefully looked for and relieved by catheterization Carbachol or the raised posture occasionally obviate the need for catheterization

SPECIFIC

Immune sera

As already indicated, the use of sera has been practically abandoned since the introduction of chemotherapy Theoretically, antitoxic sera should be an advantage by neutralizing toxaemic states, provided refinement of the serum by digestion of

Gross L (1948) *Schweiz med Wschr*, 78, 159
Fox, M J, Krumbiegel, E R, and Teresi J L (1948) *Lancet*, 1, 746

DIETS IN FEVERS AND ACUTE FEBRILE CONDITIONS

GENERAL PRINCIPLES

The mere existence of fever reduces appetite, depresses the alimentary processes and may render ingestion of foodstuffs painful or even impossible At the same time, bacterial toxins or metabolites or tissue lysates resulting from invasion and destruction, augment the metabolic processes, with tissue loss and accumulation of waste products unless these are actively removed The old adage "feed a cold and starve a fever" was prompted more by the feelings of the patient than by his nutritional requirements A later regimen enjoining milk and slops and forced ingestion of fluids was a definite improvement in sick-room dietetics which modern advances have rounded off considerably to the therapeutic benefit and pleasure of the patients, but there is room for still further improvement

adequate diets often prove more vulnerable than others, some pathogens appear unable to invade tissues unless certain substances are present in the cells, such as vitamin B components in the neurones, which are requisite for successful invasion by the virus of poliomyelitis (Rasmussen and his colleagues, 1944, Lichstein and his associates, 1946) On the other hand, under-nourishment may favour attack and nearly always dulls the prognosis, especially in diseases with a tendency to pulmonary complications, notably tuberculosis, whooping-cough, typhus and relapsing fevers and the like

It is not possible in the space to deal in detail with the principles of modern dietetics which tend to centre round amino acids, salts, vitamins and trace elements in addition to the recognized basic requirements of carbohydrate, protein and fat Some patients may fail to ingest the required amounts because of vomiting diarrhoea, anorexia and various metabolic, dyspeptic and digestive disorders, these need special notice particularly in the very young whose reserves are low or may be rapidly depleted

DIETETIC STANDARDS

The schedule incorporating the recommendations of the Food and Nutrition Board of the National Research Council, United States of America (1948) is more generous than is attainable in many countries even in times of peace, but it is a convenient standard to aim at (*See* pages 997–998)

SPECIAL CASES AND COMPLICATIONS

Fulminating septicaemia

The nature of meningococcal toxaemia remains obscure although some of its effects in causing peripheral circulatory failure, usually without plasma loss or

vaporized with a suitable apparatus (Collison, Deedon or Phantomyser) and inhaled by a mask or in the tent, in special cases other antibiotics such as streptomycin or chloromycetin, both active against penicillin-resistant organisms, may be needed In the adrenal syndrome, characterized by a sudden fall of blood pressure, replacement therapy with an active preparation such as Eucortone 5 millilitres intramuscularly every 4–6 hours is indicated, supplemented by sodium chloride solution if required Insulin may occasionally be needed in hyperglycaemic states Coma from brain damage may raise feeding problems necessitating gastric intubation or intravenous plasma with casein hydrolysates or amino acids should persis-

crisis and a cardio respiratory stimulant such as Nikethamide (*B P*), 1 millilitre of 25 per cent solution intravenously or intramuscularly repeated every 4 hours as required

Fatal collapse after apparent recovery

Sudden oedema or the production of a pressure cone accounts for most cases of collapse but in a few instances no explanation of the collapse may be found at necropsy

Chronic meningeal inflammations

Deafness, hydrocephalus arthritis, blindness and various cranial paralyses are the commonest sequelae Deafness may be one-sided and occasionally clears up after many months Various operations have been devised to restore the circulation of the cerebrospinal fluid in established hydrocephalus, which is virtually confined to young children, Hyndman's ventriculocisternostomy (Hyndman, 1946) forms a passage between the ventricle and the subarachnoid space and thence to the basal cisterns which usually escape obliteration Laminectomy, followed by freeing of adhesions, has been carried out to relieve compression paraplegia in suitable cases

Mental changes

Persistent headache, dizziness, inability to concentrate and effort syndrome symptoms form the bulk of the mental changes, occurring mostly in adults and

WEANING DIETS

The process of weaning should take about a month in stages as undu likely to precipitate some intestinal upset.

Before one of the breast feeds a small artificial feed should be given; i increased to a full size feed and so replaces the breast. As soon as one feed is established a second one should be started in the same way. When t one is established one of the feeds should be thickened by boiling w (proprietary or cornflour), until all feeds are so treated.

Meanwhile something new or extra is added to the diet with each adv as breadcrumbs, gravy, lightly boiled egg, milk pudding, fish, or finel meat.

Specimen diets when weaning is completed

8 a m.

10 a m
Lunch Breakfast milk repeated, with soft bread dipped in milk. Co oil and concentrated orange juice, 1 teaspoonful of each.

1 30 p m
Dinner. Broth, fish, meat or egg with breadcrumbs; or gravy, pota other vegetables.
Milk pudding or fruit and milk or junket. Iron mixture.

6 p.m
cake or b
pounds.

LATER CHILDHOOD

has also been in the main

form of mince, and glandular organs such as liver, kidneys and sweetbreads thus made easy to swallow and pleasant to taste; pork pies, meat and saus only advisable for occasional use.

INFANT FEEDING SCHEDULES

The feedıng table reproduced ıncludes only drıed mılk as ıt has nowadays dısplaced raw cows mılk as the best all round ınfant food apart from breast mılk

Feedıng Table

Weıght ın pounds	No of feeds ın 24 hours	Drıed mılk (level measures)	Sugar (level) teaspoons)	Water ın ounces	Drıed ½-cream mılk (tıns per week)
6	6	2	1	2½	½
7	{6 / 5	2½ / 3	1 / 1	3 / 3½}	over ½
8	5	3½	1	4	¾
9	5	4	1	4½	nearly 1
10	5	4½	1	5	1

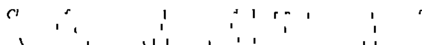
Half cream

Up to 2 or 3 months

Average weıght ıncrease 1 month 8½ pounds (10 per cent) 2 months 10½ pounds (25 per cent) 3 months 12 pounds (50 per cent)

Average heaped teaspoonful = 1 level measure = 56 graıns

Fat content 16 5 per cent no added sugar 280 ı u vıtamın D per ounce



added ın some ınstances to excess for average baby

Full cream Natıonal Drıed Mılk

Contaıns 26 per cent fat and 280 ı u vıtamın D per ounce A 20-ounce tın contaıns equıvalent of 7 pınts of mılk To reconstıtute add 5 heaped tablespoonfuls to 1 pınt boıled water

The average fluıd requırement ıs 2½ fluıd ounces per pound or 150 mıllılıtres per kılogram of body weıght

Average weıght at 4 months 13½ pounds (70 per cent) 5 months 15 pounds (85 per cent) 6 months 16 pounds (100 per cent)

Natıonal Drıed Mılk half-cream and full-cream ıs prescrıbed (the latter after 3 months) because of ıts relıabılıty and cheapness Well known proprıetary brands

groats or Farex rusks and vegetable purées are gıven

potato purées should be omitted If no improvement follows the interval between feeds should be lengthened to three hours and the amount of each feed increased or a régime of eight feeds distributed throughout the 24 hours should be adopted

No 2 Diet

(the febrile period approximately 3 550 calories)

		calories
6 a m		
	Milk, 1 glass	160
7 30 a m		
	[illegible]	970
10 a m		
	Mid morning Milk, 1 glass, toast, 1 slice, butter, 1 pat	285
Noon		
	[illegible] cream or jelly, ½ cup, cocoa 1 cup	785
3 p m		
	Mid afternoon Orange egg flip orange juice 1 cup, lemon juice 1 tablespoonful, lactose, 2 tablespoonfuls, 1 egg	230
6 p m		
	[illegible]	815
8 30 p m		
	Bedtime Milk, ½ glass, cream, ½ glass	300

The initial anorexia may only last a few days so that No 2 diet is early desired and tolerated but constant watch on the stools is imperative and in severe cases it is wiser to revert to No 1 or even a lower diet for a few days in the third and fourth weeks if deep ulceration is suspected

No 3 Diet

(suitable for early convalescence)

8 a m
Breakfast Grape fruit tomato juice, porridge or cereal with milk or cream, fish or egg, coffee or tea

10 a m
Milk and cream cracker biscuits or malted milk or weak coffee or milk shake

1 p m
Dinner Soup, clear, vegetable or purée, fish tripe rabbit or chicken, potatoes, boiled, vegetables, cheese, fruit fresh or stewed

4 p m
Tea Tea bread and butter, jam or honey or milk shakes

7 p m
Supper Eggs, omelette, fish, salmon mayonnaise or cold meats and fresh salads
Pudding and cream or custard (or ice cream) with fruit

taken in 24 hours Part should be altered to avoid monotony, into milk jelly, junket or blancmange, suitably coloured and flavoured to please the eye and palate Tea, cocoa and chocolate should merely be flavouring and not substitutes for milk as part of a meal The adequacy of the diet should be regularly checked by measurements of the height and weight increments and blood lists made for anaemia

SPECIMEN DIETS FOR SEVERE FEVERS SUCH AS TYPHOID

The construction of the actual diets in war time, particularly under Service conditions, necessarily depended on local supply, and substitutes or modifications were called for at short notice Hospital diets are variously designated No 1

small amounts at frequent intervals by day only, supplemented by fruit juice and lactose at night when awake Coleman prefers the typhoid diets distributed in eight feeds, thus 9, 11 a m, 1, 3 7, 10 p m, 1, 4 a m, believing that the stomach does not require prolonged physiological rest and that no harm accrues from wakening patients should they be asleep at the appointed times

No 1 Diet

(for first week or later when indicated approximately 2 500 calories)

	calories
6 a m	
Milk, 1 glass, 8 fluid ounces	160
8 a m	
Cooked cereal (strained) ⅓ cup, cream (thin, 20 per cent), ½ cup, coffee, with cream (thick 40 per cent) 1 tablespoonful, sugar, 1 tablespoonful	395
10 a m	
Fruit juice, 1 glass, lactose, 1 tablespoonful	150
12 noon	
Cream vegetable soup 1 cup, purée vegetable, ½ cup, cream sauce (with butter to season), ½ cup, milk 1 glass	450
2 p m	
Fruit juice, 1 glass, lactose, 1 tablespoonful	150
4 p m	
Egg flip, milk, 1 glass, sugar, 1 tablespoonful, vanilla	285
6 p m	
Cooked cereal (strained), ⅓ cup, cream, thin, ½ cup, sugar, 1 tablespoonful, milk, 1 glass	455
8 p m	
Orange egg flip, orange juice ½ cup, lemon juice, 1 tablespoonful, 1 egg, lactose, 2 tablespoonfuls	235
10 p m	
Milk, malted or coffee flavoured, Ovaltine, 1 glass	220

The presence of dyspepsia as shown by heartburn, with or without water-brash, may be due to excessive or reduced acidity, and acids or alkalis may be needed, a preliminary gastric analysis is helpful Meteorism or flatulence may be controlled by reduction of highly sweetened preparations or by changing lactose for glucose,

nized In respect of mitis strains a virulence test (a dermal reaction in the guinea pig) is required as some 10–15 per cent are avirulent but for routine purposes all

obtained from the subculture

DIFFERENTIAL DIAGNOSIS

Tonsillar and faucial inflammations

The commonest condition at all ages is exudative and follicular tonsillitis due to pyogenic infections mainly streptococcal pneumococcal and staphylococcal the onset is typically sudden and marked by pyrexia and considerable pain with hard tender enlargement of the associated lymph nodes The confluent forms may closely imitate diphtheria although the purulent exudate is typically readily distinguishable from the fibrinous diphtheritic membrane occasionally the diagnosis can only be settled by bacteriological tests Among the infectious fevers scarlet

may be difficult because several potentially pathogenic organisms are present including diphtheria bacilli in Schick negative subjects in others with a close clinical resemblance none may be isolated and the possibility of a virus may have to be considered for example the virus of herpetic or ulcero-membranous stomatitis *Blood examination may provide a pointer and serves to eliminate glandular fever* agranulocytic angina and acute leukaemia Post tonsillectomy sloughs may simulate diphtheria to a disconcerting degree unless the fact of recent operation is known In hospital infection before during or after operation may result in a form of wound diphtheria

Tuberculous *syphilitic and traumatic* exudations and ulcerations being indolent or chronic are readily recognized if their possibility is remembered

diphtheria

Nasal conditions

Purulent rhinitis pyogenic maxillary sinusitis and a foreign body (which may lead to bilateral blood stained nasal discharge) must first be excluded the presence of these conditions favours infection with diphtheria organisms as well as their persistence as a chronic carrier state

Laryngeal affections

Catarrhal laryngitis with some respiratory obstruction is common in some

Notes—Milk shakes composed of milk, milk powders, ice-cream or eggs, with

satisfactory shake

Full diet embraces all kinds of meat beef, mutton, pork, veal as well as game, wild or reared, such as guinea fowl Savouries made of cheese with meat (kidneys) fish (sardines) or vegetable (mushroom) are both appetizing and nourishing, but are rarely included in hospital menus

For fuller information one of the standard text books on dietetics especially for invalids should be consulted, such as that by Davidson and Anderson (1947)

Bogert, L J, and Porter, M (1940) *Dietetics Simplified*, 2nd ed New York, MacMillan.
Davidson, L S P, and Anderson, I A (1947) *A Textbook of Dietetics* 2nd Ed London, Hamilton
Lichstein, H C, McCall, K B, Elvehjem, C A and Clark P F (1946) *J Bact*, **52**, 105
Rasmussen, A F, Waisman, H A, Elvehjem, C A, and Clark, P F (1944) *J Inf Dis*, **74**, 41
Stevenson, J A F, and Bensley, E H (1947) *Lancet*, **1**, 568

DIPHTHERIA

DEFINITION

Diphtheria is an acute infectious disease, without a specific rash, due to invasion of the respiratory tract, and less often of the cutaneous and gastro intestinal surfaces, of susceptible subjects by the diphtheria bacillus (*Corynebacterium diphtheriae*), virulent strains produce a powerful toxin which locally causes coagulation necrosis of the tissues with formation of exudate or 'false membrane,' and systemically has a selective affinity for cardiac, nervous and renal tissues On the larynx and lower respiratory tract mechanical obstruction to respiration is the chief risk

DIAGNOSIS

Practical Points

stratified mucosa, dull white colour and tough consistency, soft, almost painless, enlargement of associated lymphatic glands, intense nauseating odour (in late cases) usually associated with irritating blood stained nasal discharge and manifest toxaemia Pain and pyrexia are of little moment but the throat of an ill child should invariably be carefully inspected, repeatedly if necessary, whether or not there is a complaint calling attention to it

prophylaxis will always be necessary unless the disease is completely stamped out whether it is likely to reappear *de novo* is highly controversial

Passive immunization

Whilst wholesale passive immunization is to be deprecated as unnecessary and not free from risk, occasions arise, especially in institutions, in which selective passive protection for particular individuals is warranted Until recently passive immunization was common practice prior to tonsillectomy, but penicillin having a wider prophylactic range, tends to supplant pre operative immunization, 4,000–8 000 units of antitoxin given intramuscularly affords protection completely for 10–14 days and partially, modifying the nature of an attack, for an additional period of like duration

Combined active passive immunization

The work of Downie and his colleagues (1941) has shown that, by giving serum and antigen (usually alum precipitated toxoid) simultaneously, immediate and prolonged protection is conferred, although the response to the latter is delayed in time, the final effect is indistinguishable from that following the antigen given alone

Active immunization

A choice of antigens is available to render this measure both safe and effective (*see* page 800)

Schick test—In pre school age subjects the Schick test, the materials for which are available from several commercial manufacturers of biological products who supply instruction on its use with each package, can be dispensed with as being superfluous more especially since active immunization has eliminated opportunities for immunization by natural means The control test is necessary as it affords valuable information as to the likelihood of a reaction following inoculation A pseudo reaction implies a warning that the dose should be small and may suffice in

TREATMENT

SPECIFIC

The order of forms of therapy is reversed deliberately to emphasize the paramount importance of early and adequate administration of antitoxin which was the first (by von Behring in 1893) and remains the most effective, of all forms of serum therapy So essential is early treatment that fever hospitals give priority even to suspected cases for observation" in order to attain this end as well as to

rarity of rickets and wasting diseases generally

Pharyngeal abscesses above and around the larynx, due to extension of a surface infection or from impaction of a foreign body such as a fish bone, may mislead unless a careful history and examination are undertaken Scalds, erysipelas, oedema from urticaria and like allergic states occasionally cause obstructive symptoms, as also may rapid enlargement or oedema of a new growth in or near the larynx

The now rare laryngismus stridulus of the rickety baby and the less rare hysterical

ment of the tracheo bronchial glands due to sepsis, tuberculous invasion or new growth, are by their slow progress readily excluded

Diphtheritic infections

Diphtheritic infections of other mucous membranes such as the conjunctiva, vagina and oesophagus are relatively rare, the condition is usually benign if detected and treated early

Wound diphtheria

Wound diphtheria may be serious but it fortunately is also rare Large surfaces such as burns, or if communicating with the respiratory tract such as broncho-pleural fistula, are particularly prone to infection Formerly, patients with nasal diphtheria and the nurses who attended them were liable to diphtheritic onychia as a secondary infection, but with immunization and specific therapy of the primary condition this condition is nowadays rare

Late or missed diphtheria

This form occurs mostly in adults or older children The primary disease may be overlooked or disregarded and local paralysis, usually of the palate, may be the first presenting symptom In wound diphtheria the adjacent nerve elements are first involved with localized paralysis which later may become generalized

PROPHYLAXIS

General epidemiological measures

The conventional measures of swabbing suspects and contacts followed by

RESTORATIVE

It is probably impossible to restore fully tissues severely damaged by diphtheria toxin, restorative or curative measures are therefore strictly supportive and to conserve what is left Little toxin can be recovered from the blood stream even at

formed or about to be formed and some workers have injected antitoxin locally to augment the general action, the method may be used for some wounds but is hardly applicable to tonsillar, nasopharyngeal or laryngeal invasions Adequate fluids with glucose, by vein if necessary, and vitamins are obviously necessary but

on the plasma proteins is necessary to maintain the optimal osmotic balance

Unfortunately, no drug is available to ward off the heart failure of toxic myocarditis or to remedy it when established, digitalis, strophanthus and quinidine are not only valueless in this respect but positively contra indicated, nor have extra amino acids, vitamins or hormones been shown to exert any clear-cut action in *averting either peripheral vasomotor failure or peripheral neuritis*

LOCAL TREATMENT

Although the days of trying to arrest the disease by killing organisms locally

cent strength is better on the whole, being especially effective against the organisms

I per cent gentian violet may be given by

)at swab Insufflation of powdered aspirin,

, may relieve the pain of severe anginose states For the nasal passages also, systemic therapy is rapidly replacing local measures although an alkaline douche is helpful in clearing purulent material, crusts, and fragments of membrane at the outset, but it is unwise to persist with a resisting child as some fluid may pass to the middle ear or down the trachea Little benefit is derived from applications to the neck glands unless there is pyogenic invasion in which case kaolin may ease pain and accelerate resolution

COMPLICATIONS

If the patient survives the initial toxaemia, in the past, low dosage by the subcutaneous route was frequently followed by a succession of complications, not infrequently by death from cardio-respiratory paralysis as long as 7–10 weeks after the onset of the disease Except for missed cases with spontaneous initial phase recovery, these tragic occurrences are rare nowadays The common injunction to nurse patients flat, that is without a pillow, has little justification, a thin, soft

obviate unnecessary notification Attempts to assess, with anything like precision, the dosage by means of the geographical site and extent of the false membrane,

which depends on the pathogenicity of the strain and the resistance of the patient. So vulnerable are young children that it is imperative to resist any temptation to decide dosage on a body-weight basis, indeed it is usual to give them as much

The route is more important than the total amount Whenever it is felt that there is a threat to life, and this is present in all cases which may develop complications, some part, usually one-half, of the antitoxin should be given intravenously, the remainder intramuscularly In practice it is usual to give the latter first and the intravenous dose ½–1 hour later Patients who may be allergic to horse globulin, asthmatics, previous recipients, and the like, are commonly tested by 0·1 millilitre

venous administration in urgent cases A violent thermal reaction may well turn the scales against recovery in a very toxic patient

Nasal, laryngeal and conjunctival forms of diphtheria are not associated with

intravenous at upper limits), severe 50,000–100,000 units Some workers add another category "hypertoxic" to which heroic doses are given, usually in a fruitless attempt to save life. All serum should be given as early as practicable; repeat dosage on subsequent days means inaccurate assessment With pre-digested

when antici-

s, after which

Chemotherapy

Diphtheria bacilli are penicillin-sensitive and the drug should not be withheld in severe cases Even if strains prove resistant, penicillin should still be given in

especially in adults who are prone to serum sensitization, penicillin alone may be warranted and some reports have been published purporting to prove that peni-

Late cardiac failure

If the patient survives for 21 days, recovery is probable except for the rare cases of cardiac paralysis of central origin, more suitably considered under nervous complications

NERVE COMPLICATIONS

The toxic neuronitis of diphtheria is peculiar in that the damage is mainly *motor, although sensory (subjective) disturbances occur especially in adults* (Cameron, 1943), they are of little importance Their occurrence depends upon several factors, including the adequacy of therapy The order of onset and of frequency is usually the following palatal, ocular, pharyngeal, laryngeal, inter *costal, diaphragmatic, and generalized with widespread (atrophic) wasting of the* musculature Little can be done in the way of treatment Aneurine has not been

tracheotomy may very rarely be needed for laryngeal paralysis, but the most troublesome complication is *respiratory failure* This may be due to (a) neuritis

volvement of the vital nuclei in the pons medulla, especially of the vagus, which

is a fast-disappearing operation Immediate removal to hospital, if practicable, should be the rule, for skill in management makes the operation a minor affair or

mides and penicillin are indicated, in increasing dyspnoea the steam tent may be tried for 2–4 hours, with fomentations to the neck and a sedative Adrenaline atropine and ephedrine have proved *disappointing but more may be expected of* Anthisan especially when spasm is a prominent feature, but oedema is much less easy to control, local applications of vasoconstrictors are uncertain and transient in their effect Cyanosis, pallor and restlessness, especially when occurring in paroxysms, demand immediate relief In hospital practice direct laryngoscopy and removal of false membrane by an electric suction apparatus is the common procedure, followed by intubation if aspiration does not relieve sufficiently

"good" children often survive when difficult ones do not' she should also know that the "goodness" depends in large measure upon herself.

TOXAEMIA

The restlessness, prostration and lethargy of diphtheria are features of the toxaemia rather than complications in the strict sense and must be countered by [illegible]

quired for severe angina

CIRCULATORY FAILURE

Peripheral

A sudden fall in the blood pressure should raise the possibility of suprarenal haemorrhage especially if a cutaneous eruption, petechial or purpuric, appears either spontaneously or at the site of needle punctures or pressure points and *replacement therapy* should be commenced at once as *in meningococcal states* (*see* page 302) Some have found desoxycorticosterone acetate in oily solutions, 5–10 milligrams daily, preferable to the natural product as absorption is slower and the action is more sustained The use of vitamins, especially vitamins C, K, and P, is justified, provided overdosage is avoided, but too often there is little time for carrying out proper vitamin level estimations or tolerance tests Intravenous plasma and additional glucose should also be used with caution with a careful watch on the effect on the heart

Early cardiac failure

If the patient survives early circulatory failure, cardiac signs tend to appear at [illegible]

or sudden bundle branch or complete block (auriculo-ventricular dissociation) with gross dilatation of both ventricles The change is abrupt without prior prolongation of the P-R interval or dropping of ventricular beats characteristic of [illegible]

De, M. N, Chatterjee, J R, and Ganguli, L (1947) *Brit. med J*, 1, 376
Downie, A W, Glenny, A. T, Parish, H J, Smith, W, and Wilson, G S. (1941) *Brit med J*, 2, 717

ENTERIC FEVER

DEFINITION

The enteric fevers include typhoid and paratyphoid A and B fevers and are characterized by profound toxaemia, intestinal symptoms, usually including abdominal distension and diarrhoea, enlargement of the spleen, sparse discrete cutaneous eruption, fading on pressure (rose spots) and when uninfluenced by specific therapy a distinctive pyrexia, commencing insidiously, rising staircase fashion to its height and subsiding gradually by lysis

CLINICAL TYPES

Typhoid fever can on occasion imitate practically any disease, but many of its ... able to the effects of injudicious ... period of 8–21 days (usually ... appear although there may be brief initial diarrhoea at the time of infection and the faeces may be infectious during the period, at least in the last few days, malaise and slight fever appear with characteristic headache and occasionally respiratory catarrh

Ordinary or classical form

Even in an average attack great variability may occur in the character and degree ... respect of other ingestion diseases, such as ... versely, ... he virulence, of the organism

... benign in contrast with some inges- ... vasions Adults, whether previously ... others similarly ... for this ... onment

Pneumonic

The onset is sudden, with rigors, pleuritic pain and pneumonic consolidation, later the classical typhoid manifestations appear

Nephro-typhoid and meningo-typhoid

Both these forms, like the pneumonic form, are probably a direct result of septicaemia It is accepted that bacteriaemia is a normal feature of typhoid fever, the organisms escaping into the blood stream from the local lesion, but septicaemia

Tracheotomy

The instruments for tracheotomy should always be at hand in case respiration

merely an airway above the site of the actual obstruction. Some form of mechanical

anaesthesia a sand bag is placed behind the neck, the head is steadied by an assistant and the left thumb and middle finger are placed on the thyroid cartilage, the forefinger on the cricoid cartilage which must in no circumstance be cut An incision of $\frac{1}{2}$–$\frac{3}{4}$ inch is made in the midline and reaches the trachea in 2 or 3 cuts cutting preferably the first two rings, the scalpel is replaced by a dilating forceps, the sand bag being immediately removed Mucus and membrane are wiped away and a Parker s tube inserted and tied firmly in position One or two layers of moist ened gauze are placed over the opening to soak away discharge and prevent the entrance of foreign bodies such as flies The inner tube is taken out and cleaned every few hours, the outer tube is changed daily and can be dispensed with in 2–4 days in a nervous child sedation may be necessary, or advantage may be taken of sleep, to remove the tube In special circumstances a rubber tube may be substituted, or a fenestrated tube to permit respiration through the mouth while a spigot is placed in the tracheotomy tube The occurrence of "dry" tracheotomy characterized by glazed mucosa and inspissated mucus is nowadays rare since the introduction of chemotherapy and the need for keeping the surfaces moist, even to the extent of cautiously instilling sterile soda bicarbonate solution into the trachea, is generally appreciated Dried plugs of mucus left in the bronchi inevitably lead to pulmonary collapse and pneumonia The need for operative procedures is yearly becoming less frequent and these have largely lost their former terrors

AFTER-CARE

Usually organisms have been eliminated before recovery is complete but occasionally they persist for months, constantly or intermittently As long as the entire population is not immunized, carriers are a potential risk to the unprotected and should therefore be suitably treated Tonsillectomy is the only satisfactory method of dealing with persistent tonsillar carriers but sulphonamide powder or penicillin douches may be given a trial for nasal cases Dimol snuff has for years had a deserved reputation for ridding patients of persistent organisms but correction of diseased conditions or deformities such as a deflected septum may be needed before elimination is secured

Convalescence should be carefully supervised for the complete restoration of

Begg, N D (1937) *Lancet* 1 857
Cameron, J D S (1943) *Edinb med J*, 50 1

at all levels, in the home, shop, restaurant and factory has done much to reduce the ingestion diseases to measurable proportions but until foods are processed, packed and wrapped under hygienic conditions, outbreaks will occur Water and milk, formerly the principal vehicles of infection, are now infrequently incriminated but in rural areas water supplies are still prone to contamination and until all milk is pasteurized it is a potential source of danger When the disease is known to be present, chlorination or boiling of water supplies should be undertaken and measures adopted for disinfecting infected or suspect excreta as well as utensils and linen So rare is enteric fever at present that active immunization is usually reserved for (a) Service personnel, (b) civilians going oversea, even to most European countries and (c) selected subjects at particular risk such as doctors, nurses and nursing orderlies

ACTIVE IMMUNIZATION

Credit for devising an effective vaccine belongs to Almroth Wright (Wright and Semple, 1897), whose researches established its value, which was clearly proved in World War I [illegible]
2,000 million [illegible]
typhosus A ar [illegible]
0 5 millilitre and 1 0 millilitre at an interval of 7–10 days for Service personnel or 3 doses, each generally smaller in amount, for civilians Recent researches have emphasized the need for using virulent organisms in which 75 per cent alcohol is used to kill instead of heat and 25 per cent alcohol replaces phenol as preservative because the latter was found to destroy Vi antigens (Felix, Rainsford and Stokes [illegible] the con[illegible]ent[illegible]onal [illegible] has not been estab-

[illegible]

B typhosus organisms per millilitre Storage at 4° C is essential as the Vi antigen is somewhat unstable A slight stinging pain from the spirit is experienced at the time of injection but subsequent reactions are less than those usually following the ordinary vaccine Single reinforcing (boosting) doses should be given yearly to those at risk or even after 6 months on entry into an endemic area Gardner (1944) concluded that the risk of invasion and a negative phase from inoculation (so-called ' provocation typhoid) coinciding with untoward effects, were negligible in actual practice

PASSIVE IMMUNIZATION

Known contacts may be temporarily protected by a dose of 20–25 millilitres of *specific antityphoid serum (containing* O *and* Vi *antibody)* prepared by Felix (1935) The main objection to this method, the development of serum disease due to the presence of albumin, has been overcome by refinement procedures similar to those used in the preparation of diphtheria antitoxin So far a specific serum against paratyphoid fever has not been made and developments in antibiotic therapy render its production now improbable Doubtless Chloromycetin or aureomycin will be used as a prophylactic in due course but no record of this has yet been made public.

may appear, either due to enhanced virulence of the organisms or depressed resistance of the host, in recognized septicaemic states due to staphylococcal or streptococcal infections, there is no hard and fast criterion between bacteriaemia and septicaemia, apart from the clinical effects of invasion and the number and persistence of the organisms in the blood stream

Haemorrhagic forms

Haemorrhagic forms, with bleeding into the skin and from mucous membranes, have been described, but they have not been satisfactorily differentiated from concurrent haemorrhagic diatheses

DIAGNOSIS

The clinical diagnosis may be far from easy unless some of the classical features are present or there is known exposure to infection Serial blood counts for the characteristic neutropenia, blood culture (using bile salt media) and the Widal reaction after the seventh day of onset are particularly useful in missed cases and carriers, but most valuable of all for ascertaining infectivity, is the isolation of *B typhosus* from the urine or the faeces or by rectal swab (an easy and reliable procedure when diarrhoea is present) on Wilson and Blair medium or similar

not only permits differentiation between the effects of immunization by inoculation

state is present, continuously or intermittently Accepted significant titres for typhoid and paratyphoid organisms are H, 1–30, O, 1–50

DIFFERENTIAL DIAGNOSIS

Differential diagnosis is from subacute appendicitis and cholecystitis, cholera, dysentery and food poisoning ulcerative colitis pneumonia, primary and second-

stage of smallpox, in fact any severe systemic infection Periostitis or osteomyelitis occasionally yields, from examination of pus the first evidence of enteric fever

PROPHYLAXIS

General Measures

any regulations to limit the activities of excretors except in so far as they engage in a trade involving the preparation and handling of foodstuffs Education in hygiene

recognized early or from some serious complication, and complications do arise unexpectedly, requiring prompt action to avoid their worst consequences

SPECIFIC THERAPY

The use of anti typhoid serum, which dates from 1907 when first used by Chantemasse in France, received a fresh impetus in 1935 when Felix incorporated virulent strains containing Vi antigen in the preparation of his anti bacterial serum Although the toxaemia appears to be controlled by serum (McSweeney, 1935, Hodgson, 1944) it is difficult to demonstrate in clear-cut fashion that the disease process is aborted, the intestinal lesion arrested and the liability to serious com plications significantly reduced Doses of 20–50 millilitres by the intravenous route (at least for the first injection) or by the intramuscular route for 3–5 successive days are usually recommended, after testing for sensitivity with a horse serum dilution by the intradermal or ocular methods

CHEMOTHERAPY

Despite the claims of Bigger (1946) and McSweeney (1946) combination of penicillin and sulphonamides has not proved to exert a decisive effect on the course of the disease, and the development of antibiotics, especially aureomycin and Chloromycetin, having specific activity against the typhoid salmonella group of organisms, has made the method obsolete Both these new drugs are relatively stable and atoxic, they act locally and are absorbed in therapeutic amounts from the gut The effectiveness of Chloromycetin appears to have been substantiated by Cook and Marmion (1949), who treated 14 cases of typhoid fever in Egypt An initial dose of 50 milligrams per kilogram of body-weight was given (in capsules each containing 250 milligrams), followed by 250 milligrams 2 hourly until the patient was afebrile, when the same dose was given 4-hourly to a total dosage of 20–22 grammes, depending on the weight of the patient and the response to treatment The average course of treatment was 9 days, and of the 14 patients 3 relapsed but responded to a second course As with sulphonamides and penicillin, children should receive doses relatively large to their body weight, approximately one third the adult dosage at 0–3 years, one half at 4–10 years, and two thirds to full at 11–15 years If relatively toxic drugs are used, such as streptomycin or Polymyxin, the dose should be closely related to the body weight Defervescence occurs in 24 hours or less, but is often accompanied by temporary aggravation of toxaemia presumably from absorption of lysed bacterial products, and the tem perature may rise again to 99°–100° F for a day or two, the subsequent clinical improvement, however, is sustained and sometimes dramatic in its clear-cut character in a disease characteristically unpredictable and prone to relapse Administration of the drug in the first week or two gives much better results (Bradley, 1949), making early recognition of cases of paramount importance Dietary schedules as a result have lost their importance while complications, formerly frequent and dreaded occurrences, are negligible or absent On the other hand, in the established carrier state, usually due to cholecystitis, little effect can be expected without surgical measures, as the drug does not appear in the bile Renal excretors however, may confidently be expected to respond as there is little or no evidence that organisms become drug fast

TREATMENT

General

[illegible]

confidence of the relatives The claims of rest as a restorative must not mean that [illegible]

[illegible]

except for children and light women

Diet

[illegible]

although for infants milk may be the complete food, it fails to meet all the requirements, including taste, for adults Variety, within the limits of what is tolerated, should be a daily aim, for the few days, occasionally extending to a week or longer, in which little but water and glucose is tolerated, the patient can usually dispense with the need for proteins and fats Nowadays, however, protein in the form of casein hydrolysate can replace it, being readily digested, an unpleasant taste has been successfully overcome in a recent preparation, Calcium Caseinate, which can be made into a milk shake which, when iced, is pleasant to taste and to swallow To avoid unnecessary repetition specimen dietaries on page 818 should be consulted, and followed with due regard to the likes of the patient and the state of the stools In special cases intravenous therapy is required (*see* page 809)

Drugs

[illegible]

HISTORICAL NOTE

Moscow and Carter in Bombay independently demonstrated human transmission by infected blood The louse was suspected as the probable vector by Mackie (1907) in India and 6 years later Nicolle, Blaizot and Conseil in Tunis proved transmission by lice The disease is still common in Eastern Europe and North Africa, as well as in large areas of Asia and Africa, and *occasionally it occurs in Ireland The first patients admitted to the*

by ticks

CLINICAL FORMS

Ordinary

The sudden onset after an incubation period of 6–10 days, or occasionally up to 14 days, commences with violent headache, pains in the neck and lumbar region, intractable vomiting and often painful joints Constipation may be succeeded by diarrhoea High continued fever, ranging about 104° F , suddenly drops to normal in 5–7 days with profuse sweating, and remains down for a week, During this period

relapses

Eruptive

Macular

The macular rash is not necessarily a sign of severity

Haemorrhagic

The appearance of a purpuric rash and haemorrhages from the mucous membranes is a serious sign, this form is commonly associated with jaundice from hepatitis, to which the bleeding is probably due

Non-epidemic

It is usual to discuss the tick-borne disease separately, especially that due to *T duttoni*, but there are so many varieties of other spirochaetes that this is impracticable here The tick disease is less fatal, the periods of fever are shorter and the number of relapses usually greater Rashes and haemorrhages are rare

Case Mortality

Case mortality averages 10 per cent, but may range from 1 per cent (tick form) to 50 per cent (louse form) in unfavourable circumstances

COMPLICATIONS

Abdominal

Meteorism

Severe cases show some degree of meteorism ranging from abdominal tumidity to marked distension, being due to a combination of excessive flatus production,

actively, especially if there is vomiting, by use of the Miller-Abbott tube and Prostigmin as for paralytic ileus due to any cause.

Haemorrhage

Including mild grades of oozing ordinarily not recognized by inspection, this complication occurs in about 10 per cent of cases; even when progress appears

tendency to recurrence, the difficulty of locating the bleeding point renders haemostasis by operation usually impracticable unless perforation occurs.

Perforation

oxygen and intravenous plasma, and immediate operation give the best chance of recovery, on the whole even toxic patients stand the operation well and perforation rarely occurs a second time. Occasionally a ruptured lesion may be walled off by adhesions and spontaneous healing ensue

Cholecystitis

carriers requiring surgical drainage, or removal of the gall-bladder Appendicitis, mesenteric infarction, pancreatitis and splenic abscess or rupture are infrequent occurrences which may be ascertained only at operation Suppurative parotitis is a rare but troublesome complication.

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Eruptive

Macular

The macular rash is not necessarily a sign of severity.

Haemorrhagic

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Case Mortality

Case mortality averages 10 per cent, but may range from 1 per cent (tick form) to 50 per cent (louse form) in unfavourable circumstances

DIAGNOSIS

The identification of the spirochaete in smears in the patient's blood establishes the diagnosis, which is generally easy on purely clinical grounds when the disease is prevalent The prompt therapeutic response to arsenic is sufficient confirmation in cases in which the organism has not been found The red cells and haemoglobin are greatly diminished and the polymorphs increased

DIFFERENTIAL DIAGNOSIS

Almost any acute fever may be simulated and sporadic cases are readily missed

The differential diagnosis includes typhus fever, malaria, enteric infections, [illegible] Weil's [illegible] appear [illegible] culosis, [illegible]

PROPHYLAXIS

General

[illegible] page 1203) are applicable [illegible]

[illegible] clear whether bed bugs can be vectors In dealing with tick-borne fever, destruction of the animals and scrub reservoirs is essential Dibutyl phthalate is more effective against ticks than is D D T

Active Immunization

Although living and dead vaccines have been used the therapeutic success of arsenic has obviated the need for developing means of immunization

Passive Immunization

The same circumstances have curtailed the use of convalescent serum, which, however, has been used in prophylaxis in special conditions with marked success

TREATMENT

General

During the febrile period appetite is poor, but every attempt should be made to attain a high caloric intake with vitamin supplements, especially in the ill nourished subjects who form the bulk of the victims On the other hand, after the crisis the patient may discover a voracious appetite which may tempt him to dietetic indiscretions, resulting in enteritis, meteorism and prostration Small, frequent feeds are safer and more effective in restoring the depleted plasma proteins

Specific

Neoarsphenamine is the safest and most effective of the arsenical preparations, for adults a single intravenous dose of 0 3–0 6 gramme dissolved in 5 millilitres of

and further injections may be necessary In Tunisia, 3 injections were given to many of the patients, 0 3, 0 6, 0 9 gramme at intervals of 2 days, with very favourable results Some cases proved resistant to arsenic, for these, as for cases in which arsenic is contra indicated, such as those with severe hepatitis, nephritis and the haemorrhagic syndrome, convalescent serum was employed in 1945 with success in doses of 20 millilitres intravenously (Gaud and Morgan, 1947–48) Its use in checking epistaxis, haemoptysis and intestinal haemorrhage was attended with striking success Penicillin has been found rather less effective than arsenic, the febrile period, persistence of organisms in the blood and the relapse rate being *significantly higher, but penicillin may be indicated when liver or kidney damages* makes further arsenic an added hazard (Tucker, 1946)

The tick borne sickness is particularly resistant to chemotherapy, and large doses are required to effect cure

COMPLICATIONS

Dehydration and protein depletion

Certain complications such as protracted vomiting, albuminuria and enteritis are so common as to be clinical manifestations Malnourished subjects rapidly reach a dangerous state Intravenous fluids, preferably Hartmann's with adjustment of salts according to loss of acid or base, and plasma, are needed in the severer forms

Hepatitis, nephritis and haemorrhagic syndromes

These are taken together as they are linked causally; the primary damage is on
'buminuria, nephritis
iorrhages occur from
is perhaps safer than
is arsenic for the severer forms, large doses of 2–3 mega units a day are indicated for an organism prone to become resistant Blood and plasma transfusions form the basis of modern supportive therapy as stimulants did in the past

Respiratory tract,

Respiratory tract complications include suppurative parotitis, broncho-pneumonia and lobar pneumonia

Neurological features

Neurological features such as meningism delirium and psychotic manifestations are pronounced, but encephalomyelitis is rare *Uveal tract lesions such as* iritis cyclitis and choroiditis, are common and appear late in the second or third months Optic neuritis is grave and, being bilateral leads to blindness There is some reason to suspect that arsenic may have been responsible for some of the neuritic complications

Pregnancy

Pregnancy almost invariably ends in miscarriage or premature birth The hypoproteinaemia and placental haemorrhages are sufficient *to cause the death of the foetus*

DIAGNOSIS

The identification of the spirochaete in smears in the patient's blood establishes the diagnosis which is generally easy on purely clinical grounds when the disease is prevalent The prompt therapeutic response to arsenic is sufficient confirmation in cases in which the organism has not been found The red cells and haemoglobin are greatly diminished and the polymorphs increased

DIFFERENTIAL DIAGNOSIS

Almost any acute fever may be simulated and sporadic cases are readily missed

The differential diagnosis includes typhus fever, malaria, enteric infections cerebrospinal fever, plague, influenza, rheumatic fever, infectious jaundice Weil's ... appear ... rculosis,

PROPHYLAXIS

General

The same general measures required in typhus fever (*see* page 1303) are applicable ...

against ticks than is D D T

Active Immunization

Although living and dead vaccines have been used the therapeutic success of arsenic has obviated the need for developing means of immunization

Passive Immunization

The same circumstances have curtailed the use of convalescent serum, which, however, has been used in prophylaxis in special conditions with marked success

TREATMENT

General

During the febrile period appetite is poor, but every attempt should be made to attain a high caloric intake with vitamin supplements, especially in the ill nourished subjects who form the bulk of the victims On the other hand, after the crisis the patient may discover a voracious appetite which may tempt him to dietetic indiscretions, resulting in enteritis, meteorism and prostration Small, frequent feeds are safer and more effective in restoring the depleted plasma proteins

Specific

Neoarsphenamine is the safest and most effective of the arsenical preparations for adults a single intravenous dose of 0 3–0 6 gramme dissolved in 5 millilitres of

Face

By far the commonest site is the face in the vicinity of the nose and eye particularly in middle aged females addicted to alcohol who are prone to abrasions and in whom local resistance may be lowered by vascular stasis and exposure to cold Spread is usually rapid in all directions with a tendency to symmetrical arrangement depending on local anatomical features with marked oedema of lax tissues especially of the eyelids which often are nearly closed Blister formation is common on prominent areas especially in the malar region The colour ranges from faint pink to angry dull red with a mauve tint especially at the sharply demarcated spreading edge *The old areas may be covered with dried fluid containing pus cells* and epithelial scales which eventually fall off (desquamation) leaving an unscarred surface which tends to be reddened for some weeks or months Formerly nasal operations were common predisposing causes

Ear or scalp

A discharging ear or retro aural intertrigo may be the site, or rarely nowadays a surgical operation in the vicinity but any part of the body is occasionally *involved*

Lower limbs

Varicose veins especially if complicated by eczema and ulcerations are commonly the site of recurrent erysipelas especially after prolonged standing The tendency to involvement of the lymphatics cellular tissues and regional lymph

the umbilicus

DIFFERENTIAL DIAGNOSIS

On the face cellulitis acne rosacea lupus erythematosus gnat bite bee sting urticaria (dermatitis venenata) and especially ophthalmic herpes occasionally herpes elsewhere and even herpes simplex of the buccal cavity or oro-nasal region may confuse or be the *locus minoris resistentiae* of subsequent classical erysipelas Occasionally a staphylococcal infection near the eye or naso oral orifices may resemble erysipelas On the lower limbs eczema or dermatitis of various aetiology phlebitis cellulitis gnat bites chilblains Bazin s disease and occasionally incipient *gangrene from obliterating endarteritis most frequently give rise to doubt*

PROPHYLAXIS

Little that is exact is known of the mechanism of local resistance and susceptibility to streptococcal invasion One attack *far from inducing immunity as is the* rule from the erythrogenic stimulation of an attack of scarlet fever definitely increases liability to subsequent reinfection but it is difficult to differentiate specific from non specific factors Avoidance of the hazards which are found to favour the disease forms the chief preventive measure *in the absence of reliable specific inocu*lation of streptococcal antigen In particular cases prophylactic administration of a

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sulphonamide drug or penicillin is justifiable provided precaution against induc
of drug fastness is taken, by giving an adequate dosage

TREATMENT

Local

Generally speaking, local applications, including mere protective covering of t[h]
area, are best avoided in the great majority Efforts to neutralize the organis[m]
locally or to prevent spread, by application of iodine or ultra violet radiation [i]
advance, have met with indifferent success and are unnecessary when systemic
chemotherapy is employed Eczematous or purulent dermatitis may require some
local application to prevent spread by auto inoculation, gentian violet, 1 per cent,
remains the best all round agent, but phenoxetol, 2 per cent, or Dibromopropa-
midine cream, 1 5 per cent, may be preferred from aesthetic consideration For
the itching, Anthisan 0 1 gramme every 4–6 hours or the application of lint wrung
out from iced isotonic solution, which the patient often prefers to do personally if
an adult, should give the necessary relief, but a phenobarbitone sedative is
occasionally required Irrigation with saline solution and drops of silver protein
preparations, 5–10 per cent, with cold compresses may be needed for ocular in-
flammations Some cases do better on hot fomentations.

Specific

For the large majority of cases a sulphonamide is the drug of choice, there is
room for discussion as to whether sulphanilamide, which is cheap safe and reason-
ably effective, is preferable to the less soluble less toxic, but potentially dangerous
preparations singly or in combination, the writer inclines to the last named choice
in doses of 6–9 grammes per day at intervals of 4–6 hours for 5 days, an alkaline
mixture sufficient to render the urine alkaline and 5 pints of fluid in 24 hours,
ensure safety in adults but some care is needed with children for whom sulphanila-
mide may be more judicious for home treatment Failure to respond in 3 days, or to
resolve in 5 days, or a relapse after cessation of administration generally warrants
penicillin therapy in doses of ½–1 mega unit of the procaine preparation once or
twice a day according to circumstances The use of aqueous solutions every 4–6
hours is reserved for toxic attacks, usually in old people with a tendency to broncho-
pneumonia Immune serum is not now used

Complications

It is well known that although recurrent attacks may individually be mild, they
[m]ay nevertheless be relatively resistant to therapy, especially when the cellular
[tis]sues are involved, and resolution may be incomplete particularly in the lower
[ex]tremities, which tend to remain oedematous or infiltrated Varicose ulcers some-
[tim]es respond best to crude cod liver oil

[E]rysipelas migrans a rare form mostly seen in infants, is usually due to partially
[resi]stant strains, but may depend on individual idiosyncrasy Increased dosage of
[th]e drug usually ensures resolution

[Si]milarly severe attacks complicated by meningitis, cavernous sinus thrombosis,
[sept]caemia, endocarditis, nephritis and broncho-pneumonia are best treated with
[support]ative measures, including administration of glucose and salts intravenously if

need be, with plasma in debilitated states in addition to intensive specific therapy, preferably a combination of a sulphonamide and penicillin Oedema of the glottis may precipitate an alarming emergency requiring tracheotomy, should local measures and antispasmodic (adrenaline) or antihistamine (Anthisan) drugs and oxygen by B L B mask or tent, fail to relieve the condition

AFTER CARE

The brilliant response to specific therapy is liable to blind the clinician to the need for adjuvant measures for rapid restoration to full health or for prevention of further

ing, ma

commo

treated

effective than are tonics or even a holiday, provided the intelligent co operation of the patient is secured

GASTRO ENTERITIS, ACUTE

DEFINITION

Acute gastro-enteritis (infective or zymotic enteritis, infantile summer diarrhoea cholera infantum) is an acute disorder of the gastro-intestinal tract, it is of variable infectivity and severity, affecting infants, and is characterized by diarrhoea and usually by vomiting, by acute intoxication and dehydration and by profound *metabolic changes with hepatic damage In a proportion of cases, varying with the* season and prevalence of respiratory infections, bacterial complications, notably otitis and mastoiditis, pneumonia and pyelitis appear at some stage and prejudice recovery The severer forms are very deadly and are prone to lead to debility, marasmus and relapse

CLINICAL FORMS

In a disease so protean and unpredictable, classification into types *or categories* may prove impossible in many instances

Mild or Abortive

The true nature of the disease may only be determined by subsequent evidence of ... assuming enhancement of virulence by rapid ... resistance may play a significant part in

Diarrhoeal

Diarrhoea alone is relatively benign apart from fluid loss which at first is rapidly compensated by oliguria and various tissue adjustments *The undue loss of base* substances in the excretions sooner or later results in acidosis which may manifest itself suddenly—the so called trigger phenomenon—when pyrexia may appear for the first time

sulphonamide drug or penicillin is justifiable provided precaution against induction of drug fastness is taken, by giving an adequate dosage.

TREATMENT

Local

are

loc

advance, have met with indifferent success and are unnecessary when systemic

the itching, Anthisan 0 1 gramme every 4–6 hours, or the application of lint wrung out from iced isotonic solution, which the patient often prefers to do personally if an adult, should give the necessary relief, but a phenobarbitone sedative is occasionally required Irrigation with saline solution and drops of silver protein preparations, 5–10 per cent, with cold compresses may be needed for ocular inflammations Some cases do better on hot fomentations.

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ensure safety in adults, but some care is needed with children for whom sulphanilamide may be more judicious for home treatment Failure to respond in 3 days, or to resolve in 5 days, or a relapse after cessation of administration, generally warrants

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It is well known that although recurrent attacks may individually be mild, they may nevertheless be relatively resistant to therapy, especially when the cellular tissues are involved, and resolution may be incomplete, particularly in the lower extremities, which tend to remain oedematous or infiltrated Varicose ulcers sometimes respond best to crude cod-liver oil

Erysipelas migrans, a rare form mostly seen in infants, is usually due to *partially* resistant strains, but may depend on individual idiosyncrasy Increased dosage of

reasonable bounds When the services of a bacteriologist or biochemist with special experience or resources are available they should be used both in life and at necropsy, but organized team work is essential for worth while research

DIFFERENTIAL DIAGNOSIS

Recognized Gastro-intestinal Diseases

In infants these diseases can only be excluded by bacteriological examination using selective media (for example Wilson and Blair's medium for organisms of the typhoid group, and desoxycholate citrate agar for those of dysentery) and the bacteriologist must have full particulars including details of the administration of drugs, sulphonamides and antibiotics particularly, which may inhibit growth Giardiasis, helminthiasis and amoebic dysentery need special techniques

Specific Intoxications, Chemical and Biochemical

Although chemical poisoning is now rare, especially in babies, the biochemical group is probably important, certain organisms such as *Bacillus botulinus* and *Staphylococcus pyogenes* are known to produce thermostable toxins, and coliform organisms and enterococci are believed to be capable of such production under special conditions

Diarrhoea

Secondary or symptomatic diarrhoea may occur in any acute fever, notably measles, whooping-cough, pneumonia, cerebrospinal fever and poliomyelitis

Dyspepsia

Acute gastro-enteritis must be differentiated from dyspepsias of all kinds, whether dietetic, allergic or metabolic

PROPHYLAXIS

Breast Feeding

The most important single factor is breast feeding Provided the mother is reasonably well fed, the breast fed baby can thrive under the most unfavourable conditions Apart from the biological merits of breast feeding compared with substitutes, it is economical and has definite psychological values for the mother as well as the infant The only contra indications are tuberculosis, mastitis and lack of milk Objections are commonly aesthetic or social and are best overcome by

General Hygiene

Cleanliness is required even with breast feeding and the mother known to harbour epidemic respiratory pathogens should wear a mask In special cases bacteriological examination of the breast may be necessary, pathogenic cocci may be eliminated by a course of penicillin or other antibiotic The bottles and teats of the bottle fed baby should be boiled and feeds heated to pasteurizing levels (165° F for 10 seconds or 145° F for 30 minutes) which does not greatly alter the milk and kills

TOXAEMIC

termination

CLASSICAL

The sudden onset of profuse vomiting and diarrhoea with early prostration, dehydration and intoxication, sometimes fatal in 24 hours, is too obvious to need detailed description, but some cases, in the final issue malignant, may commence less suddenly or even insidiously

DIAGNOSIS

In the absence of bacteriological or other special tests the diagnosis is necessarily based on clinical grounds When a number of infants are involved and other causes are excluded, the presence of an infectious agency can be assumed with reasonable assurance, but sporadic cases, without ascertainable connexion with each other, may present an aetiological problem for which no ready solution is at hand

Routine investigations should include a complete history of the patient, including the relevant data regarding dietary, family, environment, recent contacts and attendances at clinics

In addition to clinical examination, a search should be made for parenteral in-

and faeces is necessary to exclude typhoid-dysentery-salmonella and giardia infections, note should be made of the relative frequency of coliform organisms, enterococci, paracolon and proteus A sample of blood (from deep jugular or

The biochemical investigations vary with the character of the attack and are detailed under complications In severe attacks, with toxaemia and dehydration, estimation of plasma bicarbonate, total plasma proteins, urea and non protein nitrogen, and of serum calcium, sodium and potassium, furnish valuable aid in controlling therapy Examinations of urine and faeces should include output and abnormal constituents, with detailed analysis in special cases

There is hardly a limit to the number of investigations which can be done, but their restricted usefulness and the interests of the patient should keep them within

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whether artificial or breast should aim at the best standard of nutrition as sho by growth and weight increments, appearance and general well being

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should live a sheltered life, visits from friends and relations should be infrequent

required

In hospitals and nurseries, isolation techniques should be applied at least until the patient is proved non infectious

IMMUNIZATION AGAINST OTHER DISEASES

Active immunization against diseases which may lower resistance, especially whooping-cough and diphtheria (and tuberculosis when available), should be carried out in the first 6 months Passive protection should be afforded against measles by means of immune sera and sulphonamides or antibiotics may be used as prophylactic measures against either respiratory or intestinal infections whenever there has been close exposure, especially in institutions

TREATMENT

Two main aims suggest themselves (1) neutralization or elimination of toxaemia or septic focus, (2) restoration of disordered metabolism, but treatment must be begun before the nature of the infection or metabolic disorder can be investigated, in point of fact this is rarely established fully

In practice it is convenient to divide the cases into (a) hydrates, (b) latent dehydrates, (c) manifest dehydrates

HYDRATES

ment Persis- hours, half- even boiled

Choice of food

Any suspicion that the type of infant food already in use had a bearing on the development of enteritis, shown by previous dyspepsia, warrants a change, but in

stages, by single scoop replacements in every feed rather than by giving particular feeds at full-cream strength, additions of from ½ to 1 teaspoonful of sugar (lactose or glucose) are made to each feed at this stage Vitamin supplements of 25 milligrams

of vitamin C, 500 i u of vitamin A, and 200 i u of vitamin D are given twice a day, replaced by orange juice and cod liver oil when tolerated Those infants over 6 months are weaned or gradually resume their weaning diet

Feeding intervals

Although special cases may be fed 2 hourly, most babies under 3 months do best on 3-hourly feeds and thereafter are fed 4-hourly vigorous, healthy babies can be successfully fed at the longer intervals from the start The ill or convalescent child may be unwilling or unable to take or retain the full feed (which is finally aimed at his normal or expected, not his current, weight), it is generally better to give more concentrated feeds, and make up the fluid deficit between feeds, than to shorten the interval, or give supplementary feeds Special high-protein preparations, such as Prolac, may tide over the temporary difficulty Some workers find a dried milk with added carbohydrate such as Benger's Food useful for this purpose The presence or development of fever is an indication for chemotherapy; full doses of a sulphonamide, usually Sulphatriad, 3 grammes, and penicillin 400 000–500 000 units by day, are given orally at intervals of 3 or 4 hours, if vomiting is trouble some, and after 6 months of age for penicillin always, the intramuscular route is used By these measures, maintained for 5–6 days, parenteral infection may be prevented or controlled

LATENT DEHYDRATES

Timely administration may forestall sudden collapse, with coma or convulsions

MANIFEST DEHYDRATES

Apyrexial, non toxic, mildly dehydrated babies often respond satisfactorily to the regimen given to non dehydrates, and make a prompt and complete recovery Nevertheless, they are always potentially in danger as irreversible tissue changes may occur and prejudice recovery If there is no improvement in a few hours especially if vomiting and diarrhoea persist, the sooner they receive parenteral fluid the better the prognosis

Infusion route

The internal saphenous vein at the ankle ¼–½ inch above the malleolus is the first choice but if whole blood is to be given the elbow vein is more suitable Bateman's double cannula remains the best all round method but fine Polythene tubing has decided advantages Some workers prefer rapid administration with a 2 way

llary route
methods
adminis

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HYDRATES

The appearance and weight are sufficient clinical guides in assessment Persistence of green or diarrhoeal stools necessitates starvation for 12-14 hours, half-strength Ringer-lactate (Hartmann's) solution or saline solution, or even boiled,

Choice of food

strength. In the third month, the full-cream variety is substituted, preferably in

carbohydrate, such as Dextri maltose meets individual requirements best and a variety of proprietary foods are available (page 815) For premature babies casein digests or hydrolysates have been tried with considerable success (Jorpes Magnusson and Wretlind, 1946) but the unpleasant acrid taste is objectionable to older babies accustomed to sweeter feeds, in Pronutrin this has been largely eliminated Pure amino acids such as methionine and cystine, are readily taken by mouth and may be used to supplement inadequate feeds, such as whey and weak mixtures but are both expensive and scarce

HEPATITIS

All fatal cases show the morbid changes of toxic hepatitis but much variation in the extent and degree is encountered Jaundice, strangely, is an infrequent but deadly complication, although recovery may ensue The tendency to purpura is [illegible]

of amino acids and vitamins

INTUSSUSCEPTION

When much colic is present intussusception may occur, commonly *it is an* agonal or post mortem event

MARASMUS

This disorder, formerly common, is nowadays rare since resuscitation and feeding methods have been improved Dyspepsia is the commonest cause but some babies fail to thrive although the digestion appears normal Transfusion of fresh blood may provide the needed stimulus sometimes requiring also a change of diet or even of environment

OTITIS AND MASTOIDITIS

[illegible]

babies should have the ears inspected daily and myringotomy [illegible] repeated whenever necessary Timely antrotomy under local anaesthesia is a safe and rewarding operation *which intensive chemotherapy has rendered rare.*

PYELITIS

Renal complications *have lost their importance inasmuch as they can readily be* prevented or cured with sulphonamides or antibiotics

PURPURA

Usually associated with severe hepatitis purpura may appear unexpectedly The prothrombin index and tests for capillary fragility as well as bleeding and coagulation times furnish data for rational therapy with vitamins K P and C

AFTER CARE

Although there is a definite tendency to recurrence and relapse babies surviving from severe gastro enteritis may, and usually do, make complete recoveries and

Fluid

Half strength Hartmann's solution with 5 per cent glucose is the most suitable for the majority of patients, but additional calcium sodium, or potassium may be
a
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r

cotton wool filter at the air inlet is equally effective

Amount —The standard requirement is exceeded by 25–50 per cent in the first 12 hours to correct dehydration and may need an excess of 10–20 per cent for some days to offset excessive fluid loss in faeces and vomit At the same time increasing amounts (½ fluid ounce 2 hourly at first) of fluid and later of dilute milk mixtures are given as tolerated more or less as for non dehydrates When hydration is completed hypoproteinaemia, previously masked by haemoconcentration, appears and is corrected by fresh human plasma, best given continuously in the fluid in a 1 4 or 1 5 concentration whereby the osmotic balance of the circulating blood is kept within safe limits Fresh blood may be needed for anaemia Stale plasma may cause pyrogenic reactions presumably from the impact of protein break down products on the liver and may be dangerous if hepatic damage is

ages, and the common foods available in Great Britain are detailed on page 997

Specific Therapy

The measures detailed above are restorative or supportive rather than strictly therapeutic although no sharp division exists Theories that the disease is due solely or primarily to absorption of bacterial metabolites of enterococci and coliform organisms naturally suggest the use of various sulphonamides and antibiotics in the effort to control them The published reports and the writer's experience both provide insufficient ground for accepting any of these agents as being effective, a temporary or partial improvement, accompanied by diminution or

may range from 8 to 18 days and may occasionally be as long as 21 days, some observers consider missed cases or carriers the probable explanation of long in

Towards the end of the period neutropenia and loss of weight have been recorded but these changes are not constant enough to be trusted as diagnostic aids

Mild

In babies who still enjoy the benefits of some measure of maternal immunity and

Toxic

Various theories have been advanced to account for rapidly fatal attacks which occasionally occur, as in smallpox, before the cutaneous rash has appeared These "ataxic adynamic" forms, which are still encountered at times, are possibly due to direct invasion of the pons medulla by the virus, more or less in the same manner as in poliomyelitis

Suffocative

Young babies are particularly prone to dyspnoeic manifestations but older children or even adults who are rachitic, ill nourished, asthmatic or bronchitic may be affected and die early, sometimes before the appearance of the rash, from acute bronchiolitis ("capillary bronchitis") and lobular collapse

Bullous

Some of the cases recorded probably suffered from concurrent measles and pemphigus or allergic bullous eruption evoked by the virus invasion

Haemorrhagic

Haemorrhagic or 'black" measles is so rare as to raise doubts of its clinical entity Many of the cases so described were doubtless instances of haemorrhagic smallpox, or of unrecognized blood diseases now known to cause haemorrhages from the mucous membranes

Non eruptive

The existence of this form is similarly questionable, as attenuation almost to suppression by means of immune serum is characterized by a scanty, widely dis crete rash An ordinary initial phase without rash apparently does not occur.

Congenital

The rash in the mother and infant may appear simultaneously, present on delivery which may be premature, or develop shortly thereafter In the infant the attack is typically mild, catarrhal features being slight or absent and the lesions

rapidly attain average physical standards Supervision of both mother and baby are required with due attention to their diets and economic and social circumstances

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MEASLES

DEFINITION

Measles (Morbilli) is an acute specific fever, with an initial or prodromal stage of variable length averaging slightly over 2 days, during the latter part of which

tinted pigmentation and in a minority of cases fine powdery desquamation Coryzal and bronchitic complications are so constant as to be clinical features, while enteritis, otitis, pneumonia, encephalitis and various suppurative and ulcerative processes may accompany or succeed the primary disease Apart from common cold and influenzal catarrhs it is the commonest infectious disease known and under urban conditions few escape attack

HISTORICAL NOTE

The name morbilli is from the Italian *morbillo* in contradistinction to *il morbo* (plague) Although doubtless known in antiquity the first recognizable description was given in the tenth century by the Arabian physician Rhazes, in which a clear distinction was made from smallpox although Arabian writers generally regarded smallpox and plague as different forms of the same disease Credit for proof of differentiation is ascribed to Sydenham whose description of the London epidemic of 1664–70 has been widely accepted as final, although some workers continued to confuse it with scarlet fever which was often referred to as morbilli confluentes Early attempts at active immunization were reported by Home of Edinburgh in 1759 by rubbing blood taken from a case at the height of the disease into the scarified arms of susceptibles, he claimed successful induction of mild measles with a shortened incubation period but considerable doubt has been thrown on the validity of his observations

CLINICAL FORMS

Average attack

The average attack has become decidedly milder in the last decade or two, for which no ready explanation is forthcoming Granted that secondary infections,

Toxic erythemas

These may be toxic or allergic in character from bacterial metabolites (notably streptococcal), chemical and biochemical preparations including drugs, such as *phenobarbitone, sulphonamides and antisera* Fever is variable but sensitivity tests and eosinophilia usually furnish proof of the diagnosis

PROPHYLAXIS

GENERAL

Young, sickly children especially those already debilitated by pneumonia, tuberculosis, whooping cough, otitis or enteritis, should be shielded from measles until a more opportune time, but as the disease is almost inevitable under urban *conditions, it is well to have it over if* possible, preferably just before entering school In adolescent or adult life, attack tends to be severe, occasionally marred [illegible] and the domest[illegible] and occupa- [illegible] g virus is [illegible] ion need entail no more than washing the room and contents with soap and water

IMMUNE SERUM

Pooled antiserum either from donors recently attacked (convalescent serum) or in childhood (adult serum) is commonly used to confer protection in selected cases referred to already, or to secure attenuation or modification of an attack It is doubtful, however, whether the latter should be attempted as measles is usually mild and the risk of transmitting homologous serum jaundice is still considerable [illegible] children than [illegible] substances in the former, and chemical antiseptics, heating and ultra-violet radiation may fail to neutralize the infective agent The *gamma* globulin fraction of adult serum has not been found to transmit hepatitis, due either to the high concentration of antibodies or merely the process of fractionation (Janeway, 1948) This preparation should therefore be chosen whenever available The dosage depends on the degree of refinement and ranges from 0 1 to 0 2 millilitre per pound of body-weight in the first 5 days after exposure, for attenuation the dose should be halved or given in the latter half of the incubation period Pooled convalescent serum (unrefined) usually protects when 0 2-0 3 millilitre per pound is given, but adult serum, being less reliable, is usually reserved for attenuation Placental extract occupies, as regards potency, a midway position between convalescent and adult serum (McKhann and Chu, 1933)

ACTIVE IMMUNIZATION

Despite the successful transmission of mild measles (Rake, 1943), active immunization is still in the experimental stage The virus can be attenuated by serial passages in the growing chick embryo, but a fair proportion of presumed susceptibles fail to develop the disease, whatever the mode of inoculation, also the possibility of transmitting some other virus infections, such as poliomyelitis or jaundice,

anomalous or confined to the upper part of the trunk The infant may escape the maternal invasion, only to be attacked after delivery after the usual incubation period If the maternal attack occurred 10–14 days previous to delivery and the baby escaped infection, passive protection is conferred lasting somewhat longer than if the mother suffered measles in childhood

Pre natal

Attack with subsequent permanent immunity not followed by miscarriage or premature delivery is a rarity Usually the foetus is killed hence congenital defects are necessarily infrequent

DIAGNOSIS

In the great majority of cases identification of measles presents no difficulty especially at epidemic periods Sporadic cases without history of exposure may give trouble, especially if first seen when Koplik spots have faded or are succeeded by

urticarial, usually mislead rather than assist the diagnosis

DIFFERENTIAL DIAGNOSIS

Rubella

Especially in adults imitation of measles may be close even to the presence of "shadow Koplik spots " Minute haemorrhages on the palate (Forchheimer s spots) are infrequent and may occur in other conditions On the whole, the disease is milder, the lesions finer and more profuse and, except on the face, are rarely followed by staining or desquamation, the pink suffusion of the conjunctivae and widespread lymphadenopathy are characteristic but may be encountered in measles, the blood picture, neutropenia with plasma and Turck cells, is common to both diseases

Scarlet fever

In children the morbilliform rash may become confluent and closely simulate scarlet fever except on the extremities where a discrete pattern tends to persist Extinction of the rash does not follow intradermal injection of anti streptococcal serum although inhibition can usually be demonstrated by injecting immune measles serum in the pre-eruptive stage (Debré s phenomenon)

Smallpox

Formerly much confused, the centrifugal papulo-pustular rash when fully developed is easily distinguished from measles, although bullous forms of the latter might simulate it in the early stages

Other infective eruptions

CHEMOTHERAPY

Healthy children do not require routine chemotherapy to forestall suppurative complications, but those known to be prone to bronchial catarrh or who are carriers of respiratory pathogens should receive a sulphonamide (preferably Sulphatriad) or penicillin, when the risk is great or mixed pathogenic flora are present the two drugs should be combined in full therapeutic doses to avoid inducing resistance

COMPLICATIONS

Laryngitis

Laryngitis is common at the onset and if slight it does not need special treatment, but increasing stridor, restlessness cyanosis and indrawing of the intercostal spaces indicate laryngeal obstruction from oedema or spasm of the glottis Steam inhalations by electric kettle or jet, and hot fomentations to the neck are still considered of value, but nowadays to relieve spasm Anthisan 25 milligrams 4-hourly for a child of 1 year, and for restlessness phenobarbitone, ½ grain as [illegible]

[illegible] of the risk of a severe serum reaction [illegible]

under direct vision may be required in severe cases Tracheotomy used to carry a high mortality in pre-chemotherapy days, due to the marked liability to septic broncho pneumonia

Ulcerative stomatitis

Mild grades of ulceration involving lips, tongue, gums and the buccal mucosa are not uncommon and usually respond well to the local measures already detailed Generally speaking, both sulphonamide and penicillin are best avoided locally reliance being placed on large systemic doses to promote local bacteriostasis and resolution Extensive ulceration, usually called cancrum oris, and formerly a common cause of death, is now exceedingly rare doubtless some cases were aggravated by caustic applications in the vain hope of killing the organisms directly

Broncho pneumonia

Interstitial damage revealed by round cell infiltration of the peribronchial connective tissue is less amenable to therapy than the secondary infection of the bronchioles and alveoli Intensive combined chemotherapy is indicated because there is in practice insufficient time to identify the organisms and to test their susceptibility to these drugs If the response is unsatisfactory penicillin may be exchanged for some other antibiotic such as streptomycin or aureomycin or penicillin by inhalation may be tried to supplement intramuscular administration Serial x ray examinations form a valuable check on the therapeutic response The development of dyspnoea and heart failure are countered by oxygen and stimulants

must be considered Deliberate exposure to a natural attack under favourable conditions may be warranted especially in females who may become pregnant, on account of the risks of miscarriage or foetal abnormalities (Hill and Galloway, 1949) The use of immune serum to attenuate cannot be recommended unless the preparation has been proved to be innocuous

TREATMENT

GENERAL

in some communities is so detrimental that removal to hospital is justified on social grounds even though the clinical state appears satisfactory In the young, deterioration may be sudden and irreversible The hygiene of the mucous mem-

1–2 per cent, for the nose and mouth and topical application of gentian violet 1 per cent to ulcerated lesions In the pyrexial stage the diet is necessarily restricted fruit juice drinks milk shakes, fresh or stewed fruit and custard and light puddings with vegetable *purées* form the basis of popular diets, generally, hot drinks relieve the faucial soreness and tendency to cough but some prefer iced drinks Although the mere fact of swallowing is often sufficient to check a hacking cough, it may be necessary to give a child Mistura Codeinae pro Infantibus (*N F* 1949) and a powerful drug such as heroin or dihydrocodeinane (Dicodid) may be needed, for an adult A cool room, quiet atmosphere, hot drinks and a tepid sponge if necessary, will promote restful sleep better than drugs but chloral, bromide or phenobarbitone may be required for nervous or unstable subjects

SPECIFIC

range from 10 to 50 millilitres according to the age of the patient and the severity and stage of the disease

atropine, administered with caution to avoid inspissation and blockage of the bronchioles with subsequent lobular collapse

MUMPS

DEFINITION

Mumps (epidemic parotitis) is ...
virus, which has a special affinity
generative organs, pancreas and
former view that the disease is primarily a disorder of the parotid glands and extensions to other organs are complications or metastases is no longer tenable Although no age is immune it is most common at 2 periods, 5–15 years (school age) and 18–25 years (military service) and almost invariably confers lifelong immunity

The overall mortality is low, mostly confined to children under 5 years, the average death rate being 3 per million

HISTORICAL NOTE

... males ...

DESCRIPTION

Parotid or other Salivary Glands

Bilateral parotitis is the commonest form, usually one side preceding the other

and lower teeth and to a lesser extent between individual teeth The orifices of Stensen's ducts are prominent and usually injected In a small proportion of cases the submandibular salivary glands are involved, occasionally the sublingual and rarer still these are affected without manifest parotid involvement

Orchitis and Ovaritis

... of parotitis and

salivary gland involvement (Montgomery, 1936) Unilateral involvement is 2 or 3 times more common than bilateral (the right being twice as common) and the second gland is usually affected 1 or 2 days after the first In nearly 50 per cent, atrophy, partial or complete, follows, but sterility is rare, probably not more than in 4 per cent of all cases can mumps be incriminated (Seguy, 1942) Ovaritis is much less frequent, occurring mostly in adolescent girls and is difficult to diagnose with certainty, some cases preceding, or without, salivary gland involvement have been recorded

such as nikethamide Empyema is extremely rare, aspiration and introduction of penicillin solution 1,000–5 000 units per millilitre of pure crystalline preparation usually ensure resolution without rib resection

Otitis, mastoiditis and sinusitis

Timely chemotherapy prevents these complications or rapidly effects cure, except when resistant bacterial strains are encountered Should operation be required, adequate vitamin intakes, especially of ascorbic acid, are helpful in promoting healing

Enteritis

Initial diarrhoea is common and usually transient, but infants and some young children may suffer from gastro-intestinal disturbances indistinguishable from infective enteritis requiring similar measures in treatment (page 845)

Encephalomyelitis

This dreaded complication is more common in adolescents and young adults than in children—an additional reason why it is best to have measles when young The chief risks are bulbar involvement with cardio respiratory embarrassment, and broncho pneumonia Controlled dehydration and hypertonic solutions intravenously, usually 25–50 per cent glucose in distilled water, 50–100 millilitres given every 4 to 6 hours, may reduce cerebral oedema as in polio-encephalitis Little benefit can be anticipated from immune serum unless the disease is still spreading, when intravenous doses of 25–50 millilitres may be tried Caution must be exercised in removing cerebrospinal fluid lest a pressure cone effect be precipitated

Tuberculosis

[illegible]

reagent, such as *para* aminosalicylic acid, for the purpose

AFTER-CARE

An attack in a child or even an adult debilitated from any cause should be re- [illegible]

Goodall E W (1925) *Clin J*, 54 69

Lymphatic glandular enlargement

unwary doctor until the toxaemia and foetor announce, too late, its true nature Dental and alveolar inflammations may also mislead

Tumours

Tumours, including chronic fibrosis, are generally unilateral Occasional persistence of swelling after mumps may confuse

Drugs causing salivation

Drugs such as mercury and iodides cause increased salivation, occasionally accompanied by obvious parotid swelling

Chronic diseases

Rare chronic diseases such as Mikulicz's and Heerfordt's syndrome reveal their nature by their chronicity

PROPHYLAXIS

Isolation of patients until all swellings have subsided is still the accepted practice although virus cannot normally be recovered after the first 2 or 3 days Quaran

of contacts from the

rifice of

ks, and

similar establishments Until a reliable method of immunization is available it is advantageous for contacts, at least before puberty, to develop the disease and get it over

ACTIVE IMMUNIZATION

Levine (1944) deliberately let events take their course in a school whereupon 50 per cent of the presumed susceptibles contracted the disease, unfortunately several of the adults associated with the school were similarly attacked A formol inactivated suspension of monkey virus was given by Stokes and his co-workers (1946) to children 50 per cent of whom were considered to be immunized from subse

e

blood

PASSIVE IMMUNIZATION

A number of workers have used convalescent serum in prevention but generally found it inferior, volume for volume, to measles serum The possibility of transmitting homologous serum jaundice is a serious objection to its indiscriminate use (Beeson, Chesney and McFarlan, 1944) Safer reagents are the *gamma* globulin

lable hen required

more

MENINGO-ENCEPHALITIS

Most cases of meningo-encephalitis have appeared about 4–7 days after parotid swelling commenced usually when subsidence had started in a few cases it preceded parotitis or orchitis by a few days (Macrae and Campbell 1949) A remarkable outbreak in children reported by Gordon (1914) was characterized by vomiting diarrhoea and coma and many deaths ensued Lymphocytosis occurred in the blood and cerebrospinal fluid but changes in the brain were inconspicuous There were acute interstitial inflammatory changes in the salivary glands On the whole the mortality from encephalitis is low about 10 per cent if cases with fluid changes but without clinical involvement are included it is much lower

PANCREATITIS

is infrequent and constipation the rule but there is no steatorrhoea in a few instances diabetes mellitus ensues and this is usually fatal

DIAGNOSIS

Although the diagnosis is usually obvious in salivary gland involvement abortive cases may cause difficulty and non swelling cases may be impossible to establish without laboratory aids

There is a relative and absolute lymphocytosis up to 15 000 total white cells of which 45 per cent may be lymphocytes from the first to fourteenth day of the

cerebrospinal fluid may show moderate lymphocytosis without manifest nervous involvement

The virus can be transmitted to monkeys or grown on the developing chick embryo from salivary secretions in the first 3 or 4 days and it has been isolated from the blood and cerebrospinal fluid The complement fixation test on the blood and fluid is positive Reagents prepared from monkey parotid gland and yolk sac suspensions have been used to denote immunity by a positive sensitivity reaction but the method is still in the experimental stage (Habel 1945)

DIFFERENTIAL DIAGNOSIS

Parotitis

Suppurative parotitis (unilateral or bilateral) may occur in any disease in which foul mouth is common for example typhoid fever and uraemia In a few cases suppuration has followed mumps Polymorphonuclear leucocytosis is present early and eventually suppuration occurs

Calculus

Salivary calculus is strictly unilateral the submandibular gland is more frequently affected than the parotid The swelling varies with ingestion of meals or even thought of meals

CONVALESCENCE AND AFTER-CARE

In the vast majority recovery is rapid but the occurrence of complications may be attended by much invalidity. Infectivity is probably much shorter than the duration of glandular swelling but to be safe most authorities urge isolation for 14 days.

Adams, F. (1939) *Genuine Works of Hippocrates*, vol. 1 New York: Wood

54, 285

PUERPERAL FEVER

DEFINITION

logy cannot be established Although puerperal fever has been a notifiable disease

postabortum cases

HISTORICAL NOTE

The infectious character of puerperal fever appears to have been first recognized by White (1773) who recommended the segregation of infected from "clean" cases and treat-

TREATMENT

7 8 per cent compared with 24 7 per cent in a similar control group

More recently diethylstilboestrol has been used to prevent orchitis (Savran, 1946, Hoyne, Diamond and Christian, 1949) with promising results, in doses of 1–2 milligrams 4 times daily for 5 days or until parotid inflammation subsided The measure appears free from untoward side-effects

COMPLICATIONS

Orchitis

When orchitis has already developed diethylstilboestrol is recommended in larger doses 5 milligrams 4 times daily until resolution is effected, of 19 cases treated by Hoyne, Diamond and Christian the average duration of orchitis was

atrophy (Wesselhoeft and Vose, 1942)

Meningo encephalitis

Treatment is on general lines as for post infective encephalitis generally (page 281) The cerebrospinal fluid changes closely resemble those of poliomyelitis but are readily distinguished from tuberculous meningitis by the presence of polymorph cells sometimes predominating and normal sugar levels

Pancreatitis

Restriction of diet, with high carbohydrate content, usually suffices but the onset of diabetes mellitus would necessitate revision of the dietary with use of insulin

Other complications

Other complications, such as deafness, mastitis, optic neuritis peripheral neuritis, herpes zoster, nephritis and suppurative parotitis, are treated on general principles,

Iostevin and Black, 1946)

examination of throat, nose, lochia, urine (catheter specimen) and any septic lesion, full blood counts, investigation of blood chemistry, x ray examination of the lungs and occasionally of other organs, are required as a routine and in special cases more elaborate investigations are necessary So important is the bacteriological finding that repeated tests with different media, anaerobic as well as aerobic may be required as the clinical picture may give little clue to the identity of the invading organism Isolation and identification of micro-organisms is the affair of the bacteriologist but the clinician must know what to ask for and expect, and how to put to good account the information he receives

Bacteriological sources and channels

the source of the infection

Rarely the pneumococcus is the invading organism

Exogenous or endogenous—*Staphylococcus pyogenes aureus* is most common, and always a potentially dangerous, organism in this category, being widely distributed on the human skin, nasal passages and in dust

Endogenous (usually from the gut)—The organisms found are (a) aerobic coliform bacilli, non haemolytic streptococci and (b) anaerobic anaerobic streptococci, *Bacillus welchii, B tetani* (rare).

In practice such a hard and fast division into categories is rarely tenable, tetanus and welchii infections, for instance, are frequently introduced from outside especially in criminal abortions

DIFFERENTIAL DIAGNOSIS

Puerperal fever should be differentiated from the following conditions

(a) Reactionary or stress fever from emotional strain or fatigue

(b) *Fever and malaise from absorption of toxic substances from over acting or* lacerated muscles during labour

(c) Constipation

(d) Milk fever from over-production of milk, or from infection usually with *Staph pyogenes*

(e) *Retained products of conception, especially if the placenta is decomposing*

(f) Intercurrent and concurrent diseases common cold, febrile catarrh, influenza, *tonsillitis, scarlet fever, pneumonia, pyelitis (commonly during pregnancy* and may be overlooked), tuberculosis (apical, miliary, pleuritic or meningitic) salpingitis, appendicitis, endocarditis (rheumatic or infective), new growth ectopic gestation and blood *diseases, are among the commonest sources of error* Occasionally the patient has some grade of puerperal sepsis in addition to one or more of these febrile disorders

PROPHYLAXIS

(1) Antenatal supervision with dietary supplements, including *iron if required* and improved obstetric technique are undoubtedly important prophylactic factors,

ment of the septic genital passages by postural drainage Gordon (1795) laid the blame at the door of careless doctors and nurses for carrying the disease from patient to patient, who in those days were almost invariably delivered in their homes In the United States of America, Holmes (1843) also stressed the extreme contagiousness of puerperal fever in a classical exposition and four years later Semmelweis advanced additional evidence of in-

connexion with abortion

DESCRIPTION

regards anaemia and hypovitaminosis, may largely determine the clinical character of the disease, but the nature of the invading organism (or organisms), the initial dose or succession of doses and the site of entrance, may be equally important, in a particular case the decisive factor may be difficult to identify with anything

ity
tissues

and veins

(c) Spread to the peritoneal cavity pelvic or abdominal

(d) Access to the blood stream in a transient form (bacteraemia) or in a persistent and rapidly multiplying form (septicaemia)

(e) Extra genital sepsis especially of the urinary tract and breasts

In severe invasions any part of the body may be involved as detailed under complications

DIAGNOSIS

It should be assumed that sepsis is the cause of fever until some other factor is clearly incriminated The occurrence of purulent vaginal discharge, pelvic pain, malaise and anorexia after delivery should suggest that all is not well, delayed uterine involution, or a mass in the parametrium, abdominal tenderness and rigidity, prostration, rigors and vomiting should in addition suggest a severe

but no system or organ should be overlooked Blood culture, bacteriological

(Tab Ferr. Sulph or *Tabellae Ferri Sulphatis N F. 1949*) and may require in addition a transfusion of fresh blood or liver therapy. Vitamin B_{12} appears to play a role in protein synthesis in addition to its anti-anaemic activity Constipation *must be avoided by a suitable diet* and early use of the toilet, but obstinate cases may require enemas or aperients to tide over the acute or recumbent period.

LOCAL

The best drainage is secured by the Fowler position provided it can be main-

to take a general anaesthetic well, in other words, to treat the patient rather than the disease Perineo-vaginal sepsis may be treated with Dettol, Katiodine or Dibromopropamidine in solution or cream, all of which are active against Gram negative as well as against Gram positive organisms, and equally safe for cervico-uterine sepsis Glycerin as originally advocated by Hobbs (1932) still has a place in

dammed up should

catheter

position

should generally be deferred until inflammation has subsided In post abortum haemorrhage is a more common and urgent

secure

placen-

after evacuation is practised much less than formerly, some workers never necessary and few leave the packing in position for more than 4–6 hours On *removal a few more fragments may come away with the gauze* The local use of heat, whether by fomentation, electric cradle or infra-red radiation, is rarely practised except for the pain of peritonitis, these measures are of considerable therapeutic *value in promoting resolution in protracted cases*

SPECIFIC

The use of sulphonamides (Colebrook, 1936) and of penicillin (Dolphin and

hly

the

rate is now less than 1 per cent and may be expected to fall still further all except mild cases it is usual to combine the two drugs in full dosage, 6–9 grammes *of Sulphatriad and 1–2 mega units of penicillin daily* at intervals of 4–6 hours, according to severity When the infection is controlled intervals of 8–12 hours may serve or procaine penicillin may be given once or twice daily A short intensive

but sepsis may occur in uncomplicated labours in the best circumstances. Sanitary pads should be sterilized, not merely disinfected, in view of the risk of spore-bearing infection

(2) While confinement at home is safer than in a bad nursing home or maternity unit, the better obstetric facilities usually available in the latter may offset the [illegible]

good dividend Dust suppressive measures are easier to apply in modern buildings with up to date equipment

(4) The wearing of masks an accepted practice in surgical operating theatres from 1910 onwards was not introduced into midwifery until 1930 Until a more efficient mask is devised, attendant staff with colds and catarrhs and even carriers of pathogenic streptococci, should be debarred from practice until proved to be innocuous

(5) Special risks, whether due to malnutrition, diathesis, or developmental factors, such as placenta praevia need special consideration

(6) Subjects known to be infected or to possess poor resistance to infection, should be protected in advance with penicillin or other antibiotics Sulphonamides are too toxic or uncertain in action for the purpose and in the usual prophylactic doses may induce drug fastness Vaccines and immune sera have likewise little scope in prophylaxis especially since the introduction of penicillin (Harris and Shook, 1949)

TREATMENT

General or Restorative

A small, well ventilated, cheerful looking ward preferably with a balcony or verandah suits the majority of patients better than a single room Rest and sleep must be secured especially in the acute, toxaemic stage, when personal and domestic worries particularly in post abortum cases, may seriously hinder progress [illegible]

typhoid dietary regimen (*see* page 817) the ordinary feeds should be supplemented by milk (2 pints daily) either with the main meals or as milk and egg shakes between meals Unless generous rations of fresh fruits are available, 100 milligrams of ascorbic acid should be taken daily Anaemia is so common in puerperal states, at least in minor forms as almost to be the rule and must be combated early and actively Some cases do not respond quickly to the conventional iron therapy

(Tab *Ferr Sulph* or *Tabellae Ferri Sulphatis N F 1949*) and may require in addition a transfusion of fresh blood or liver therapy Vitamin B_{12} appears to play a role in protein synthesis in addition to its anti anaemic activity Constipation must be avoided by a suitable diet and early use of the toilet but obstinate cases may require enemas or aperients to tide over the acute or recumbent period

LOCAL

The best drainage is secured by the Fowler position provided it can be main tained without distress and without pressure on the leg vessels which might favour venous stasis and thrombosis Placental fragments should be removed if they cause persistent haemorrhage or foul discharge but undue haste is to be deprecated it is wiser to combat toxaemia circumscribe the area of sepsis and prepare the patient to take a general anaesthetic well in other words to treat the patient rather than the disease Perineo vaginal sepsis may be treated with Dettol Katiodine or *Dibromopropamidine in solution or cream all of which are active against Gram* negative as well as against Gram positive organisms and equally safe for cervico-uterine sepsis Glycerin as originally advocated by Hobbs (1932) st'll has a place in

confines of the uterine cavity Purulent material may be readily dammed up should the uterus be acutely flexed *in either direction necessitating* the use of a catheter which may be left *in situ* for drainage purposes Correction of the malposition should generally be deferred until inflammation has subsided In post abortum cases the same problems arise although haemorrhage is a more common and urgent feature than gross sepsis and dilatation of the os may be required to secure admission of the finger or the blunt flushing curette to remove the ovum or placen

after evacuation is practised much less than formerly some workers [illegible] necessary and few leave the packing in position for more than 4–6 hours On removal a *few more fragments may come away with the gauze The local* use of heat whether by fomentation electric cradle or infra red radiation is rarely practised except for the pain of peritonitis these measures are of considerable thera peutic value in promoting resolution in protracted cases

SPECIFIC

The use of sulphonamides (Colebrook 1936) and of penicillin (Dolphin and

except mild cases it is usual to combine *the two drugs in full dosage* [illegible] of Sulphatriad and 1–2 mega units of penicillin daily at intervals of 4–6 hours according to severity When the infection is controlled intervals of 8 12 hours may serve or procaine penicillin may be given once or twice daily A short intensive

course lasting 5–6 days is more effective, less disturbing to the patient and less prone to cause sensitization or to induce drug fastness than prolonged low dosage methods Although the two drugs have not been shown conclusively to

therapeutic agent combination of the drugs has many advantages and few draw backs In practice the use of drugs must be started and often the infection is successfully combated before the identity of the organism has been established sometimes it is never established When operative procedures even merely remov

B welchii) in pre-chemotherapy days much used are rarely given nowadays even as an adjuvant Human blood or plasma is a much more popular measure

COMPLICATIONS

Parametritis and pelvic cellulitis

ous procedure is rarely needed nowadays Local heat and anodynes may be required for the relief of pain Heroic procedures such as hysterectomy and ex cision of thrombosed pelvic veins are rarely practised nowadays hysterectomy is occasionally indicated in Caesarean section complicated by sepsis and excision of

Peritonitis pelvic and general

Pain and distension point to this complication but cases may be fatal with little

intravenous fluids given preferably with plasma Laparotomy may be required for localized collections of pus or for relief of obstruction by fibrino-purulent adhesions

Septicaemia and pyaemia

Few infections fail to respond in some measure to combined sulphonamide and

penicillin therapy A careful watch for the development of anaemia whether hypochromic or haemolytic ensures maintenance of defence mechanisms by means of repeated transfusions of fresh blood

Endocarditis

This is relatively rare but is always a serious complication commonly due to haemolytic streptococci other than group A usually groups C and G Continuous administration of penicillin is indicated as for infective endocarditis generally some workers have found benefit from concurrent heparinization

Venous thrombophlebitis

100–200 milligrams of dicoumarol depending on the prothrombin level are given daily for 2 days but are not continued if the level falls below 20 per cent of the normal The threat of haemorrhage from idiosyncrasy or cumulative action can be anticipated by daily examination of a catheter specimen of urine for red cells The course may be repeated 7 10 days later or a third course given (Wright 1946) if required Pressure on the veins must be avoided as it is prone to favour thrombus formation Gentle exercises in bed may safely be employed in the early stages to promote the circulatory flow but are best avoided if thrombus formation has occurred because of the risk of pulmonary embolism Early cases may benefit from injection of 5 millilitres of 1 per cent procaine into the region of the lumbar sympathetic ganglia posterior to the tips of the transverse processes of the 4 lumbar vertebrae on the affected side pain numbness and coldness are relieved in half an hour or so complete resolution often follows in 7–10 days (Leriche 1934) instead of months or there may be partial recovery from the persistent oedema which so often follows venous thrombophlebitis In selected cases surgical removal of the clot may procure prompt recovery as in arterial embolism a much less common accident

Pyogenic complications

the invading organism should be re tested and some other antibiotic such as streptomycin or aureomycin substituted if need be

Pyelitis and cystitis

These common complications of pregnancy and the puerperium can usually be prevented or controlled by sulphonamides to which the common urinary pathogens coliforms and streptococci are sensitive and high concentrations of the drug may be reached in the urine even with doses as small as 1 gramme a day sulphanilamide or sulphacetamide may be given for prolonged periods without ill effect Occasionally organisms develop resistance unexpectedly and other antibiotics or mandelic acid may prove necessary in case of relapse Irrigation of the renal pelves may sometimes be required or special procedures for renal malformations may be necessary

course, lasting 5–6 days, is more effective, less disturbing to the patie prone to cause sensitization or to induce drug-fastness, than prolo dosage methods Although the two drugs have not been shown con

therapeutic agent, combination of the drugs has many advantages and backs In practice the use of drugs must be started, and often the successfully combated, before the identity of the organism has been sometimes it is never established When operative procedures, even me ing placental remnants, are performed, organisms may gain access to

Andrews, 1949) Immune sera, streptococcal and staphylococcal (o *B welchii*), in pre-chemotherapy days much used, are rarely given now as an adjuvant Human blood or plasma is a much more popular measu

COMPLICATIONS

Parametritis and pelvic cellulitis

These respond well to chemotherapy but resistant organisms or late ment of therapy may result in local abscess formation or spread to the p The vaginal route, through the posterior fornix, is usually the best ap evacuating the pelvic abscess Laparotomy, formerly a frequent and hig ous procedure, is rarely needed nowadays Local heat and anodyn required for the relief of pain Heroic procedures such as hysterector cision of thrombosed pelvic veins are rarely practised nowadays, hyst occasionally indicated in Caesarean section complicated by sepsis and thrombosed veins in spreading thrombosis in which the risk of pulmonar is grave (Moses, 1946) Laparotomy for evacuation of tubal pus may b the acute stage but is preferably dealt with later, sometimes by excisio danger of spreading peritonitis has passed

Peritonitis, pelvic and general

Pain and distension point to this complication but cases may be fata

intravenous fluids given, preferably with plasma Laparotomy may be re localized collections of pus or for relief of obstruction by fibrino-purulent

Septicaemia and pyaemia

Few infections fail to respond in some measure to combined sulphon

INFECTIOUS DISEASES

RUBELLA

DEFINITION

Rubella (German measles, third disease) is a mild, eruptive fever, distinct clinically and immunologically from measles and scarlet fever, and is due to a filtrable virus, which confers specific immunity, usually life long Discrete pink

diagnostic features, damage to the *growing foetus by the virus in the early months* of pregnancy makes it a potentially serious disease

HISTORICAL NOTE

The first epidemic of rubella was described by Jahn in 1807, and the clinical features were characterized in detail by Wagner in 1834 Long considered a measles scarlatina hybrid the independent stature of rubella was established at the International Congress of Medicine in London in 1881, although some observers apparently considered it an attenu ated form of measles

DESCRIPTION

MILD

In children compared with adolescents and adults, the disease is relatively in frequent, and is typically mild Compared with measles it is mild at all ages but it is occasionally so severe as to be indistinguishable from measles except for the absence of Koplik spots

SEVERE

Epidemics, such as the 1940–41 series, involved most of the civilized world, including Australia and the United States of America, adults, particularly Service personnel were chiefly affected and attacks were sometimes so severe and atypical as to suggest a new disease

DIAGNOSIS

There is usually in older subjects a prodromal period lasting up to 24 hours, with malaise, cough, slight sore throat and enlargement of lymph nodes Although Koplik spots do not appear, faint macular elements may be visible on the buccal mucosa of the cheek and occasionally there are petechiae on the palate, Forchheimer's spots (Forchheimer, 1898) which, however, are not peculiar to this disease The rash appears on the face and rapidly spreads over the whole skin surface, lasting 24–48 hours, and is succeeded by a purplish tint especially on the face Initial neutropenia may be accompanied by transient lymphopenia, *changing* by the fifth day to lymphocytosis, with plasma and Turk cells (Hynes, 1940) Desquamation is absent or negligible, usually confined to the face When a rash *looks like measles on the first day, and like scarlet fever on the following day,* the diagnosis of rubella should be considered

astitis

actation is usually resumed when resolution occurs

uerperal psychosis

All grades of mental disease from mild, temporary disorientation to incurable sanity may be encountered The prognosis depends on the hereditary and personal background, when toxaemia, whether eclamptic or infective, or environmental and personal stresses are the main factors, a prompt recovery is the rule ter the exciting causes are neutralized The habitual abortion seeker, adolescent elinquent and mental defective present special problems outside the scope of this ticle, as they come into the province of the psychiatrist and social worker.

FTER-CARE

Chemotherapy has considerably shortened and simplified after-care, as complete esolution is nowadays the rule except in some cases of femoral thrombophlebitis with persistent oedema Cervical erosion, uterine displacements, and perineal amage may require correction at this stage, and attention to the general health hould not be neglected Rest and graduated exercises prevent the tendency to *ackache and pelvic pain formerly so common in women of the lower and middle* lasses Anaemia should always be forestalled and treated actively Advice about ubsequent pregnancies may present difficulty; with proper antenatal supervision he risk may be less, even when sepsis is complicated by psychoneurosis, than the sychological trauma of the stigma of childlessness, at least in some social classes rends and fashions in this matter change with the times

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Septic Attacks

Septic attacks are now very rare, at least in the classical form, prolonged fever, faucial ulceration and recurrent rashes, generally of the gyrate or circinate varieties with predilection for the larger joints are the main features but the incidence of

... due to haemolytic streptococci of Griffith's types 2, 8 and 14 (occasionally 1) have been associated with septic complications (Allison and Gunn 1932) but

(Russell and Sherwood, 1949)

Toxic Attacks

Toxic attacks are commonest in young children, even in infants, who are generally relatively free from the disease High fever, prostration, frequent vomiting, delirium and coma precede the rash, which tends to be patchy and dusky; occasionally death occurs before the appearance of the rash

Haemorrhagic Types

Haemorrhagic forms are exceedingly rare, haemorrhages into the skin and from the various mucous surfaces may complicate a general toxaemic or septicaemic state

Scarlatina Sine Eruptione

As scarlet fever becomes milder, especially since cases without a rash can be proved on bacteriological and immunological grounds to be epidemiologically significant, the distinction between this disease and infective tonsillitis (streptococcal) tends to disappear Strains which lose their toxigenicity do not necessarily lose their invasiveness, indeed the relationship is quite often an inverse one The capacity of a strain to multiply and invade, its epidemic potential, is also not uniformly related to virulence, although repeated human passages generally end in enhancing virulence

Surgical Scarlet Fever

The puerperal uterus, burns and scalds, surgical operations, in fact any condition in which the skin or mucous membrane is broken, may become the site or portal of infection Occasionally a faucial or nasal carrier may himself infect a wound which is naturally more vulnerable to invasion than mucous membranes

DIAGNOSIS

Although a straightforward case may be readily and accurately diagnosed, anomalous or abortive attacks ("formes frustes") may raise doubts, and the imitation of scarlet fever by other ...

more effectively for demonstration purposes

DIFFERENTIAL DIAGNOSIS

Measles

Measles is only with certainty differentiated by the presence of Koplik spots, although the marked catarrh and blotchy pattern of the rash are sufficient guides in the majority of cases

Scarlet fever

Infective mononucleosis

The blood changes in this condition may simulate those of rubella, although most haematologists have little difficulty in differentiating the immature monocytes from Turk cells a finding confirmed by the Paul Bunnell test (Deumié, Brumpt and Thomas, 1940–41)

Secondary syphilide

The face is avoided but otherwise the resemblance to rubella may be close, except that the condition tends to persist and to leave a coppery tint for some weeks History of a primary lesion and the Wassermann reaction provide the key to the diagnosis

Pityriasis rosea

In pityriasis rosea a herald patch on the neck or trunk is followed by lesions in quick succession with a pink margin and yellow scaly centre lasting several weeks Pink eye, lymphadenopathy and Turk cells are absent

Toxic erythemas

Toxic erythemas are allergic rashes due to ingestion of certain foods and drugs, especially sulphonamides, phenobarbitone and the like Horse serum used to be a common cause

Fourth disease

Fourth disease (Dukes' or Filatow Dukes' disease) (Dukes 1900) was probably streptococcal tonsillitis followed by toxic erythema adenitis, albuminuria and desquamation formed the main clinical features

Fifth disease

Fifth disease, or erythema infectiosum is unknown as an epidemic phenomenon in Great Britain although localized outbreaks have been reported in foreign countries The appearance of the rash on the face, chiefly on the cheeks, followed by morbilliform or circinate lesions on the extremities, accompanied by polymorphonuclear leucocytosis, also suggest a streptococcal origin with allergic background

Sixth disease

Febrile conditions

Febrile conditions such as acute pneumonia and influenza may similarly provoke rashes, usually anomalous and transient, in glandular fever the rash is more macular or morbilliform in character

Allergic rashes

Allergic rashes, from ingestion or injection of foreign substances for example horse serum, or from exposure to emanations such as plant pollens, may cause confusion, but the presence of eosinophilia supports other features indicating this group of diseases

Drug rashes

Common drugs such as aspirin, belladonna, iodides and the sulphonamides may produce scarlatiniform eruptions, generally there is no fever or enanthem and the exanthem is usually non punctate, desquamation is variable Local rubefacients may be very misleading in the absence of a history of recent application

Skin diseases

Although skin diseases are properly the province of the dermatologist, they may be misdiagnosed especially when fever or an acute onset complicates the picture Pityriasis, generalized eczema, exfoliative dermatitis, ichthyosis and pink disease are perhaps the commonest intruders in fever hospitals

PROPHYLAXIS

Segregation

Segregation in special hospitals was formerly the principal preventive measure Even before the advent of chemotherapy some workers doubted the efficacy of segregation and even doubted the superiority of hospital over home treatment (Forbes, 1936) The mildness of the disease and shortage of hospital staffs have led to a change in official policy whereby only severe and complicated cases and those patients whose home conditions are unsatisfactory are admitted to hospital In hospitals it is sound practice to nurse each scarlet fever patient individually, either in a separate room or on bed isolation lines, in order to avoid cross infection with other possibly more virulent, serological types (Allison and Brown, 1937) Strain typing combined with epidemiological observations is of great value in detecting foci and channels of infection

Passive Immunization

umbrella

Active Immunization

The history of immunization against scarlet fever is one of repeated failure Little advance has been made upon the earliest experiments with toxin dilutions,

Apart from the clinical features the patient is usually Dick positive in the first few days of the disease (up to 10 per cent may be negative on the first day) and in over 75 per cent of cases the reaction becomes negative in the course of 3 weeks, the early use of antitoxin or more recently of penicillin has tended to lower this percentage significantly But in practice the isolation of a *beta* haemolytic streptococcus belonging to Lancefield s Group A in nearly 90 per cent of instances, belonging to one of Griffith s serological types is the accepted laboratory test, in

may fail to yield growth at the first trial Streptococci fulfilling all the accepted conditions may be present as a harmless saprophyte in other eruptive states or respiratory infections The presence of a polymorphonuclear leucocytosis gives valuable supporting evidence especially in excluding virus invasions which may or may not be accompanied by eruptions

DIFFERENTIAL DIAGNOSIS

Prodromas

In fever hospital practice the prodromal rashes of other infectious diseases notably of measles and chicken pox give the most trouble, and may give rise to serious consequences if admitted to open wards The true character of these

*confluent and uniform resembling that produced by sunburn but it may be irregu-*lar and patchy and is often confined to the upper trunk

Rubella

The imitation of scarlet fever by rubella may be close especially on the second or third day of the disease In addition rubella patients may harbour scarlatinal strains as temporary or persistent carriers and they may be Dick negative reactors at the first test Fortunately the blood picture is different especially by the presence of plasma and Turk cells but polymorphonuclear leucocytosis may be present in a streptococcal carrier and mask the characteristic rubella changes especially should plasma and Turk cells be absent as occurs in some 10 per cent of cases

Diphtheria

Streptococcal angina may resemble diphtheria although the local pain faucial swelling and soft, readily detachable exudate should provide a clue, pending the outcrop of the rash Sometimes these two conditions coexist, or succeed each other after a short interval

Tonsillitis

Tonsillitis may similarly imitate scarlatinal angina from pyogenic invasions other than streptococcal occasionally *Staphylococcus pyogenes* (Aronow and Wood 1942) appears to be capable of provoking a rash clinically indistinguishable from scarlet fever

penicillin Unfortunately the need for *giving the drug by injection preferably for* the first day or two at intervals of 4 or 6 hours is a serious disadvantage oral administration or the use of procaine penicillin preparations (once or twice daily) is less effective, may induce drug fastness and is reserved for the last 3 or 4 days of therapy when a therapeutic response is already manifest It is true that penicillin may be given orally to young babies but scarlet fever is very rare at this age Among newer antibiotics aureomycin given orally is readily absorbed to reach effective *blood concentrations* but the drug is definitely less active than penicillin against the

with penicillin and the sulphonamides

COMPLICATIONS

In the era before serum and chemotherapy adenitis otitis nephritis and rheumatism occurred in from 5–10 per cent of cases, but now these complications are only a fraction of 1 per cent and could be reduced still further

Lymphadenitis

Early mild involvement is so common as to be a clinical feature rather than a *complication but later or suppurative adenitis formerly a common disfiguring* complication can now be almost entirely prevented by chemotherapy Improved nutrition and general care of the upper respiratory tract especially of the tonsils doubtless play an important part Local heat by poultices infra red irradiation or diathermy relieves pain and accelerates resolution

Otitis media and mastoiditis

The fear that the symptoms and signs may be masked by chemotherapy is quite groundless provided the patient is under constant observation in hospital Prompt intensive treatment has made operation a rarity as multiple infections are not uncommon especially with penicillinase producing organisms such as coliforms and staphylococci *the combination of sulphonamides and penicillin is advisable*

Albuminuria and nephritis

Early appearance of albuminuria is a toxic effect and is relatively benign as compared with that of late onset (7–14 days from the commencement of the disease) which is commonly regarded as a sensitization phenomenon sometimes albuminuria is attributable to a metabolic *idiosyncrasy in which a familial predisposition* is manifest Some workers have used Anthisan in the prevention or cure of nephritis in doses of 100 milligrams 3 times a day for 5 or 6 days (Craig, Clark and Chalmers 1949) In any event penicillin should be started or resumed if streptococci are still present, with the aim of curtailing the nephropathic process

1940) Generally speaking only selected subjects are immunized, such as medical students, nurses and residential children and their guardians For details consult Parish (1948)

TREATMENT

The mildness of the disease is no excuse for neglect of rational symptomatic

fluids hot food and hot fomentations to the neck relieve pain best, but iced methods

lost their former popularity as local applications to control sepsis

Headache, restlessness and insomnia should be treated actively with compound tablets of codeine, Medinal or pethidine according to circumstances Some cases with severe angina may respond to insufflation of powdered aspirin to the tonsils when other measures fail For adults hot alkaline douches, or preferably sodium perborate, are soothing, but they are potentially dangerous in a resisting child in that fluid may be forced up the Eustachian tubes

Specific

Serum

Antiserum is usually reserved for toxic patients for early cases with profuse rash, and the occasional case in which chemotherapy fails or disappoints the earlier it is given the better the response Modern immune horse serum is both antibacterial and antitoxic but nevertheless some workers, especially those in America (Platou, Dwan and Hoyt, 1941), prefer convalescent serum Its activity may be due to the presence of inhibitory antihyaluronidase in the serum, which has been recovered from subjects convalescent from scarlet fever and from rheumatic fever (Friou, 1949) Other workers pin their faith in the treatment of toxic states

Serum has little or no effect on complications once they have supervened A unit of antitoxin neutralizes 50 skin test doses of toxin

Chemotherapy

Penicillin has almost superseded the sulphonamides The lack of toxicity and the regularity with which streptococci are eliminated from the throat in 4 or 5 days by moderate doses of $\frac{1}{2}$–1 mega unit of penicillin daily account for this the

[illegible] H and Wood W B (194?) [illegible] 119 1491 [illegible]

SMALLPOX

DEFINITION

Smallpox (variola) is an acute infectious disease with an initial phase of great severity, especially when accompanied by a petechial or purpuric prodromal rash, *by a characteristic eruption, in sequence papular–vesicular–pustular,* with centrifugal distribution and usually secondary (maturation) fever Mutant strains of the causative agent, elementary bodies (Paschen bodies), cause attacks and epidemics [illegible]

HISTORICAL NOTE

There is considerable doubt whether the plague of Athens in 428 B C, described by Thucydides, actually was smallpox or not, in any event smallpox was known to antiquity, [illegible] of a French [illegible]

syphilis, which was introduced from America either for the first time, or in a more malignant form, in the fifteenth century, presumably by Columbus's crews The last [illegible] England and Wales occurred in 1870–74 the 1898– [illegible] ted [illegible]

DESCRIPTION

VARIOLA MAJOR, MALIGNANT, ORIENTAL OR TRUE SMALLPOX

Variola major is the most acceptable of these names in the light of modern *knowledge of the aetiological agent* The high infectivity and clinical severity of this justly dreaded disease have been minutely described by Ricketts and Byles (1908) whose classic text-book, complete with coloured photographs, has not been *superseded from the clinical angle, although much laboratory knowledge has been* acquired in the interval Systematic examination of these photographs is more rewarding than many pages of text to those who have not seen a case—a rapidly increasing proportion of the profession, apart from *experience in certain theatres*

Sulphonamides are potentially dangerous although with a soluble form such as sulphanilamide combined with alkalis the risk is negligible The cautious use of alkalis both in the prevention and treatment of nephritis has long been accepted provided care be taken to avoid precipitating a state of alkalosis In general, the

Non s ippurative arthritis rheumatism

It is nowadays generally agreed that scarlatinal rheumatism with its different forms of monarthritis polyarthritis tenosynovitis and myalgia is of the same order as if not identical with rheumatic fever Therefore penicillin salicylates and per haps one of the anti histamine drugs such as Anthisan form the basis of therapy

Suppurative arthritis

Card tis

rheumatic fever and the tendency to carditis is probably less

Mucous membrane suppurations

Rhinitis sinusitis and vaginitis are usually the result of cross infection or auto-inoculation with streptococci Serous membrane invasions such as suppurative peritonitis pericarditis pleurisy and meningitis are due either to direct extension of infection or result from systemic spread as part of a general septicaemia

Rare complications

Among rare complications are toxic psychoses encephalitis myelitis thrombo-phlebitis endarteritis and purpura haemorrhagica An instance of the last named responding rapidly to penicillin has recently been recorded by Anderson Ferguson and Landsman (1949) The common explanation of these disorders if sulphon amide toxicity reinfection and essential thrombocytopenia could be excluded would leave an allerg c basis as the most probable cause

AFTER CARE

Patients can now safely be discharged from hospital in a week or so more or less as after streptococcal tonsillitis A follow up arrangement over a period of 6 weeks is advisable with review at the end of a year for evidence of rheumatism Suspect cases should receive a generous dietary with vitamin supplements

Allison V D and Brown W A (1937) *J Hyg Camb* 37 153
— and Gunn W (1932) *Proc R Soc Med* 25 Sect Epidem 927
Anderson T Ferguson, M S and Landsman J B (1948) *Brit med J* 2, 549

(Conybeare, 1939, Bowe 1942) So far as can be determined these cases are not infectious, in marked contrast with the cases which die of malignant attacks before the cutaneous rash, often referred to as the focal rash, has appeared

The mortality in confluent major forms may be up to 50 per cent, in discrete forms from 5 to 10 per cent, and in variola minor under 0 5 per cent.

DIAGNOSIS

Although typical smallpox, fully developed, is easy to recognize it must be admitted that even the expert may err in dealing with the much modified, anomalous forms of the disease The fact of exposure is invaluable, but bazaar contacts and fomites may be unknown or difficult to trace, many of the instances ascribed to aerial infection, to fomites such as laundry linen, and to carriers were probably ascribable to unrecognized subclinical attacks Prodromal rashes, especially the

tic value in the stage of pustulation, polymorphonuclear leucocytosis is the rule Fortunately several laboratory tests are available to aid the clinician

Suspected Maculo-papules and Papules

vaccinia (generalized vaccinia may confuse) are indistinguishable (Amies, 1932)

Vesicular and Pustular Stages

Fluid is drawn into capillary pipettes and sent to the nearest Public Health or virus laboratory for animal or chick embryo inoculation Elementary bodies may be readily seen in smears These and Guarnieri bodies (probably clumps of virus particles) have recently been investigated with the electron microscope (van Rooyen and Rhodes, 1948)

Crusts

Crusts are not suitable for detection of virus, but may be used as antigen for flocculation and complement fixation tests (Craigie and Wishart, 1936)

Blood

gives a positive
inated or re
t longer than

6 months previously (Downie, 1946)

DIFFERENTIAL DIAGNOSIS

In the prodromal stages differential diagnosis must be made from *influenza* pneumonia or any acute infection Prodromal rashes imitate cerebrospinal fever, scarlet fever, measles, typhus, urticaria and drug rashes

of war In its fully developed form the large, numerous pustules, confluent or semiconfluent on the head, face, hands and feet and definitely less profuse on and

further into confluent, semi confluent and discrete forms, but lesions may be discrete until the suppuration stage when coalescence occurs, often on the face only On the trunk most lesions remain discrete

VARIOLA MINOR (PARA SMALLPOX) MODIFIED SMALLPOX (VARIOLOID)

The fundamental distinction that variola minor is due to a naturally attenuated strain of virus, while modified smallpox is the result of resistance to virulent strains

together Modification may range from severity approximating to that of the classical disease down to two or three spots, depending on the effectiveness of, and especially on the time elapsing since, vaccination, protection lasting up to 5 years is the rule, between 5 and 7 years there is attenuation and thereafter an unmodified attack may ensue The crucial difference between the two forms is that whereas variola minor always, so far as is known, gives rise to variola minor in contacts, variola major, however much it may be modified in the individual affected, gives rise to attacks of unmodified severity in contacts, unless they have been previously immunized by the natural disease by variolation or by vaccination

than in chicken pox, in adults more frequently than not it is less profuse The

the buccal and respiratory mucosa (the enanthem) earlier than on the cutaneous surfaces

HAEMORRHAGIC OR TOXIC SMALLPOX

Purpura variolosa

Haemorrhages into the skin and from mucous membranes in the prodromal period herald a malignant attack which is almost invariably fatal, sometimes before the development of the papular rash

Variola haemorrhagica pustulosa

This condition is characterized by haemorrhages into advanced vesicles and pustules, in a mild form it is not infrequent and not necessarily a deadly sign

VARIOLA SINE ERUPTIONE

Febrile disturbances without subsequent rashes have been recorded in the vaccinated who have been in close contact with smallpox, usually 8–15 days previously

SPECIFIC

So far no specific drug or reagent is available apart from [illegible]

[illegible]

effect of plasma on toxaemic states Although early vaccination is effective in modifying the disease, the effect of vaccination carried out late in the incubation period is uncertain, indeed the patient may be subjected to the untoward effects of two diseases concurrently instead of one None of the antibiotics so far available have been shown to possess antiviral activity against smallpox To control the suppuration of the infected lesions sulphonamide or penicillin, or preferably a com [illegible]

[illegible]

sepsis, with the result that scarring was minimal

LOCAL

Much may be done to relieve the irritation of the skin rash For itching calamine lotion with 5 per cent phenol is usually effective and one of the antihistamine drugs may be tried Sulphonamide and penicillin ointments should be eschewed as they are not usually effective against the common skin organisms and may excite intractable dermatitis, gentian violet, triple dye or dibromopropamidine, all in strengths of 1–1 5 per cent, are alike more stable, effective and bland

COMPLICATIONS

Pyodermia

Local pyodermia, such as boils, abscesses, erysipelas and cellulitis form the bulk of the complications These suppurative processes are relatively painless and the need for early chemotherapy may be overlooked The special senses, especially the eyes, are also prone to local inflammations, blepharitis, conjunctivitis, keratitis iritis, optic neuritis, and in the haemorrhagic varieties, retinal haemorrhage Treatment is on general lines but the help of an ophthalmic specialist should be sought in respect of the severer affections Suppurative otitis media is much less common and potentially less dangerous

Cardiovascular complications

Cardiovascular complications may endanger life in severe attacks Toxic myocarditis is the commonest lesion but possibly some deaths ascribed to heart failure [illegible] on the central [illegible] carditis, phle- [illegible] a limb) have [illegible] osteomyelitis and similar conditions may occur in severe cases untreated with chemotherapy

Respiratory complications

Respiratory complications include oedema of the glottis and later perichondritis and necrosis of the laryngeal cartilages, bronchitis, broncho pneumonia and

In the eruptive stage chicken-pox, measles, cerebrospinal fever (chronic or recurrent *septicaemic form*) *erythema multiforme and papulo-pustular syphilides* are the commonest diseases which mislead Papular urticaria in children, and pustular acne in adolescents, may raise doubts for a time, especially in the vaccinated. Rare diseases such as Kaposi's varicelliform dermatosis may cause special difficulty (Mackenzie, 1943) amongst drug rashes, those due to sulphonamides, iodides and bromides are the commonest likely to resemble smallpox

PROPHYLAXIS

General

[illegible]

tents with formalin and aerosols, some consider washing with soap and water sufficient, especially in cases of variola minor.

Passive Immunization

Although passive immunization, using convalescent serum, is a practicable procedure, timely vaccination renders the measure unnecessary. Serum therapy is, moreover, not free from risk of contamination, especially with homologous serum jaundice.

Vaccination

Although exceptions do occur now and again, vaccination a day or two after exposure can and usually does protect, due to the shorter incubation period compared with variola. For details of materials, special indications and technique, *see* vaccinia, page 891.

TREATMENT

General

[illegible]

nikethamide as well as intravenous fluids, including plasma and, in haemorrhagic cases, fresh blood.

tuberculosis as part of an episode involving extension of the disease or as a terminal event in chronic advancing tuberculosis

DESCRIPTION

Acute Miliary Tuberculosis

This condition is due to invasion of the organs by way of the blood stream (haematogenous spread) arising from erosion of a vein in or near a primary focus usually recent in the apical fields of the lungs especially in childhood the next commonest site is probably infected glands especially the high paratracheal glands (Fish 1937) An attack of measles or whooping-cough is known to be an exciting cause and probably any lower respiratory infection may act similarly In adults the focus may be extra pulmonary chronic pulmonary lesions only rarely are responsible except in terminal conditions Pyrexia anorexia malaise and later dyspnoea and cyanosis are constant features cough wasting and weakness in

In actual practice the initial bacteraemia is usually missed and lung involvement heralds the disease meningeal invasion may occur at the same time or at a later stage or appear without other evidence of dissemination

Chronic Generalized Tuberculosis

system are only demonstrable with certainty by microscopic examination

Chronic Miliary Tuberculosis

Chronic miliary tuberculosis is usually confined to adolescence and early adult life Starting usually ins d ously but occasionally suddenly with a dry cough smouldering fever malaise and loss of weight it resembles influenza or bronchitis the mode of spread may be haematogenous or bronchogenic In sharp contrast to the acute mil ary form other organs than the lung escape sometimes entirely Death follows at a variable interval from two months to two years from asthenia or congestive heart fa lure but some patients recover without special treatment

DIAGNOSIS

The diagnosis is made on the previous history on the symptoms and by radiological examination of the chest A history of exposure a positive tuberculin [illegible] valuable pointers in doubtful [illegible]

examined even in the absence

early appropriate treatment

agglutination complement fixation and precipitin tests have been devised Blood

pleurisy The dysphagia resulting from inflammation of the upper respiratory tract may necessitate tube or parenteral feeding

Genito-urinary system

The genito urinary system is relatively unaffected, apart from albuminuria, unlike scarlet fever there is little tendency to nephritis apart from septicaemic forms, usually due to *S pyogenes*, when pyelitis and renal suppuration may follow

Other complications

[illegible]

without psychosomatic and psychotic sequelae In variola major pregnancy terminates almost invariably in miscarriage or premature labour The prognosis both for the mother and the child is very grave The same variations may be encountered in smallpox as in measles, the vagaries of infection are illustrated by the birth of one twin with fully developed smallpox, the other escaping completely

CONVALESCENCE AND AFTER CARE

After so serious and debilitating a disease, convalescence is naturally a prolonged affair On the other hand modified smallpox is a trivial disease, hardly more disabling than chicken pox The moral about the necessity for vaccination and re-vaccination hardly needs pointing out

Amies, C. R (1932) *Lancet* 2 558
Bowe J C (1942) *Lancet* 1, 38
Conybeare E. T (1939) *Lancet* 1 813
[illegible]

TUBERCULOSIS, MILIARY

(*See also* Primary Tuberculosis, Lung page 383 and Tuberculosis—Primary Abdominal Children page 514

DEFINITION

Miliary tuberculosis (acute generalized haematogenous tuberculosis) results from the escape of the causative organism from the primary lesion or later lesions and its dissemination throughout the organs and tissues of the body, chiefly the lungs, meninges kidneys and spleen it is commonest in infants and young children and usually occurs shortly after a heavy infection At a later age, adolescents or young adults are usually affected; it may complicate any active focal

quiescent, to safeguard them from the risks of miliary spread As re infection

the disease The most important single factor is perhaps massive infection in the home at work and in the course of intimate social contacts, thus the post war rise in incidence is probably due in the main to failure to remove infectious cases from their environment to sanatoria and settlements for the tuberculous rather than to malnutrition, overwork or bad housing Even experts are liable to overlook the fact that tuberculosis is an infectious disease, the high incidence in nurses and medical students is sufficient reminder of the fact The long-drawn out controversy as to the place of contaminated milk in the causation of tuberculosis in children is nearly ended it appears that over 90 per cent of all milk in England and Wales is pasteurized and steps are being taken to deal with the remainder This is only a *partial solution unless meat inspections are fool proof, only elimination of the* disease by destruction of infected herds can ensure complete safety

PASSIVE IMMUNIZATION

Apart from the prophylactic and curative effect of calciferol in lupus vulgaris little help is available hyper immune sera have no place in prevention

ACTIVE IMMUNIZATION

The preparation of antigen, technique of inoculation and general management of cases are considered elsewhere (page 58)

TREATMENT

GENERAL

Ur ... The value of
nour
fresh
only

taken by those who cannot tolerate cod liver oil or its concentrates

culture may be positive in miliary spread and in advanced pulmonary states but

reliable

The blood picture is not characteristic and may alter in sympathy with the patient's response to the disease or to therapy; the number of nuclei in polymorphs (Arneth counts and subsequent modifications) has been considered of value in assessing progress Blood sedimentation rate estimations are worth while but the test is not specific

Generally the diagnosis is established by serial x ray examinations of the chest, which show characteristic widespread mottling, intermediate between the ground glass appearance of virus pneumonia and the coarser lesions of broncho pneumonia, both miliary and lobular

DIFFERENTIAL DIAGNOSIS

Acute Miliary Tuberculosis

This condition must be differentiated from any acute infection such as influenza or other form of broncho pneumonia, enteric fever, salmonella septicaemia or

cluding tomograms in doubtful cases

When meningism or meningitis is a complication, suppurative meningitis, primary and secondary, polio-encephalitis, disseminated encephalomyelitis and benign forms of chorio-meningitis must be excluded

Miliary carcinomatosis, sarcoidosis, Hodgkin's disease, leukaemia, periarteritis

Chronic Miliary Tuberculosis

The existence of a primary focus is strong presumptive evidence that the condition is tuberculous, but it is not proof The main difficulty is differentiation from carcinomatosis, pneumoconiosis and tuberculous broncho-pneumonia and at times the conditions may coexist Miliary congestion of the lungs in heart failure, Boeck's sarcoid, Hodgkin's disease, or bilharziasis occasionally raise doubt for a time

PROPHYLAXIS

General

The prevention of miliary tuberculosis naturally includes the prevention of tuberculous infection at all ages and all that such prevention entails Consideration will be limited to the care of known victims of tuberculous infection, active and

50–100 milligrams dissolved in 5–10 millilitres of saline solution should be injected intrathecally every day during the first 2 or 3 weeks and then every second day for a like period (Ministry of Health 1949) *After an interval to assess the response* further intramuscular and intrathecal courses may be necessary As toxic effects are

dermatitis Anthisan in doses of 0 1 gramme every 4–6 hours will readily control the

Combination of streptomycin and Promizole

streptomycin intramuscularly each day for 120 days and Promizole 4 times daily by mouth in doses sufficient to maintain a blood level of 1–3 milligrams per

Therapy control—Estimation of drug levels in the blood cerebrospinal fluid and sputum is obviously desirable in regulating dosage and may furnish valuable prognostic evidence such as the fluid drug levels after intramuscular injections Likewise routine tests of the sensitivity of the particular strain of tubercle bacillus before during and after treatment form a valuable check on the response (Medical Research Council 1948)

Complications

Toxic Effects—The toxic effects of streptomycin and their treatment are considered in detail elsewhere (page 35) *The commonest is vestibular dysfunction* which may be dangerous in an ambulatory patient visual disturbances and renal damage are less common The initial nausea and vomiting can be controlled by Benadryl 50 milligrams by mouth and the allergic rashes may be mitigated with antihistamine drugs Although dihydrostreptomycin is less toxic than the hydrochloride or sulphate salts and should be used whenever available there is insufficient evidence that it is more active but larger doses can be used with less risk

resistance but the possibility of spontaneous emergence of resistant mu a

TUBERCULIN

The use of tuberculin to stimulate a reaction in old fibro-caseous forms of the disease with a view to promoting healing is still occasionally advocated but the antigen has no place in the treatment of miliary tuberculosis

CHEMOTHERAPY

Of the heavy metals, gold, in the form of Sanocrysin and similar preparations, has attracted most attention especially in the 1925–35 decade, it may be given either alone or be assisted by calcium or iodine Since that period a succession of sulphonamide drugs, fatty acids (chaulmoogra oil), aromatic compounds (*para-* [illegible]

ANTIBIOTIC THERAPY

Streptomycin, although by no means free from toxic side-effects, especially when [illegible]

meningitis The therapy has been in use for too short a period for a complete assessment of its therapeutic activity, far less to speak of cure, but an early experience recorded by Hinshaw, Feldman and Pfeutz (1946) in which 10 patients with acute haematogenous disseminated tuberculosis, some with and some without meningitis were treated with the drug, is promising, 4, all in the meningitic group, were still alive 3–6 months afterwards As to dosage, these received 100–200 milligrams of the drug daily by the intrathecal route for 2–4 weeks and 1 2–3 6 grammes daily intramuscularly for 3–6 months Although the other 6 patients did not survive it was considered that the course of the disease was definitely modified by the drug

Considerable experience has accumulated since then on important issues such as [illegible]

Indications

Treatment should be begun as early as possible to achieve the best results This may mean that doubtful or unproved cases may be included for the therapy and later discarded, meningitic cases certainly should be started before isolating the organism provided the cytology and reduction in the sugar level warrant it.

Dosage

[illegible]

which passes through the stages of vesication, pustulation and crusting in 10-14 days, leaving a permanent telltale scar. It is probable that the virus often enters the blood stream and various tissues and organs, in cases in which the reaction is excessive it can be recovered from the blood, the cerebrospinal fluid and from the pharynx and nasal passages

HISTORICAL NOTE

natural disease, and certain hygienic precautions were observed, fatal sequelae were not

matters Since the Lymph Establishment at Colindale was closed in 1945, most lymph used in Great Britain has been manufactured by the Lister Institute on behalf of H M Government, materials from proprietary sources must comply with the requirements of the Therapeutic Substances Act of 1925 and subsequent regulations by amendment (1931-37) The lymph is stored in ice and should be used within 10 days of issue

PRESENT POSITION

Arguments for Vaccination

(1) As practised at present, using the multiple pressure method vaccination in infancy is a trivial procedure entailing little risk, either from local sepsis or from the effects of systemic dissemination

(2) *The protection conferred by a successful "take" lasts from 5 to 7 years,* and for a variable period afterwards, up to the end of life, there is residual immunity whereby the risk of malignant smallpox proving fatal is greatly reduced if not entirely eliminated

(3) Vaccination in infancy is much less prone to the dreaded complication of encephalomyelitis than in later life, re-vaccination also is relatively free from neurological sequelae (Conybeare, 1939)

(4) *Military conscription may entail service in endemic areas, making* compulsory vaccination imperative, with all the risk of encephalomyelitis following primary vaccination in young adults

Points Against Vaccination

(1) The effective application of administrative measures for control, national and international, renders routine vaccination superfluous

cannot be excluded. Their predominance and multiplication usually heralds a

tis, in the
involves
isms can
persist in a fully virulent state in the cerebrospinal fluid long after apparent recovery and cause a relapse under unfavourable conditions in the host. Examination of the cerebrospinal fluid should be undertaken in doubtful cases, increase of protein

dissemination of the disease is much less common.

which do not warrant inclusion in the cure group

AFTER-CARE

Frequent examinations to check progress are needed. any fever, irritability or

to obviate any risk of re-infection or super-infection, even sanatoria carry their own special risks

213

VACCINIA

DEFINITION

Vaccinia (human cow-pox) is the sequence of changes in man, chiefly local cellular proliferation, following inoculation with cow-pox virus, whether deliberately as in vaccination, or accidentally as in the naturally acquired disease of human cow-pox and milkers' nodes. A successful vaccination or "take" is proved by the appearance of an itchy, red papule at the site of insertion, 3–6 days afterwards,

TREATMENT

No dressing or local application is normally required until the stage of vesication The risk of rupture of the vesicle by friction usually necessitates some protective

lesion the better

COMPLICATIONS

Local sepsis

By far the commonest complication is local sepsis, varying from undue depth and

the infection is streptococcal, and erysipelas, a rare disease in childhood may ensue

Axillary adenitis

Some degree of non suppurative adenitis is almost invariably present but un treated secondary infection may result in suppuration and require incision

Extraneous or transferred vaccinia

By scratching the subject may inoculate himself in several places, usually on the arm in the vicinity of the primary lesion Occasionally the face or other parts of the body may be the site

Generalized vaccinia

While doubtless the virus is disseminated normally in the body tissues only rarely is this manifested in generalized lesions, these appear about the same time as the insertion reaction and go through the same stages If the patient had been exposed to smallpox, this disease would have to be considered in the differential

h the phenomenon of cropping more or

the serious disease but

ed with much toxaemia

the use of anti vaccinial serum is a rational procedure (Chesney and Jubb, 1944)

Meningo encephalomyelitis

The occasional occurrence of this dreaded complication is the chief weapon in the hands of the anti vaccinationists, but in fact it provides a strong argument for early vaccination, when vaccination is carried out on those under the age of 3 months meningo-encephalomyelitis is almost unknown and under 6 months very rare, it is also rare after re-vaccination The available evidence points to the emergence of a neurotropic variant which may attack subjects with inadequate resistance, it does not appear to be due to variations in potency or mode of prepara tion of lymph or to contamination with other viruses, although this possibility

(2) Vaccination is always potentially hazardous and no certain method of making or keeping virus completely innocuous has so far been devised

(3) In the last outbreak of variola major in Great Britain, more individuals died from post vaccinal encephalomyelitis than from smallpox (this is really an argument for vaccination in infancy as most of the fatalities followed primary vaccinations)

(4) The measure does not protect against smallpox Apart from some occasional unexplained failures, this argument is not supported by the facts

DESCRIPTION

Unfortunately the interpretation of the possible reactions to the introduction of the vaccinia virus into the body is far from easy, involving the relationship of allergy and immunity, the test material is antigenic and the response of the host is an individual dynamic phenomenon Various modifications of the classical response in the unvaccinated must be considered in the light of the known variables in a given case

No reaction

Three possible explanations for the absence of reaction must be considered (a) the subject is immune (b) the operation was not properly carried out, and (c) the antigen, usually glycerinated calf lymph, was inactive Another vaccination with fresh lymph is always desirable, and imperative when there is a likelihood of exposure to smallpox

Modified local reaction

A modified local reaction is commonly a papule reaching its maximum on the second or third day without vesicle formation Recently this kind of reaction has been designated ' reaction of immunity ' and by some observers, mostly American, has been regarded as invariable in the absence of a subsequent vaccinal ' take ', otherwise it is concluded either that the antigen is inert or the operation faulty As Marsden (1944) has pointed out this conclusion is unwarranted The so-called

should be re-vaccinated as occasion demands

Unmodified local reaction, vaccinia

DESCRIPTION

Average Attack

In its typical form whooping-cough is so characteristic as to be diagnosed with reasonable certainty from the history alone The pink suffusion of the face, proceeding to cyanosis, the production of pellets of mucus or quantities of muco-pus, often mixed with saliva, and the vomit are suggest [illegible]
whoop Some patients do not [illegible]
coincides with the onset of br [illegible]
resolution may herald its reappearance In some cases the whoop may return months after cessation, usually due to an upper or lower respiratory infection

Abortive or Latent Forms

In very young babies these incomplete forms are doubtless due to the presence of [illegible]

find them completely susceptible when the next epidemic is due, in this respect closely resembling measles Patients with these abortive attacks and contact carriers are naturally more likely to spread the disease than are acutely ill patients who are segregated at home or in hospital while undergoing treatment (Blatt and Levin, 1933)

Aberrant, Atypical or Vicarious Forms

Some cases start with typical common-cold symptoms and do not proceed to a spasmodic stage subsequently; in others spasms are manifested in paroxysms of sneezing, hiccup or periods of apnoea Convulsions may occur in all these aberrant [illegible]

Over 50 per cent of the deaths occur in the first 6 months of life, and 90 per cent occur in pre-school-age groups

DIAGNOSIS

The presence of a spasmodic cough should suggest the possibility of whooping-cough, or even a merely troublesome or persistent cough when the disease is [illegible]

has never been satisfactorily excluded The common time of onset is 7–14 days after vaccination, with sudden pyrexia, headache, vomiting and meningitic signs, which may be accompanied by convulsions, paralyses and terminal coma, or which may slowly subside, ending in complete recovery In treatment, convalescent anti-vaccinial serum or immune serum prepared from the horse (available from the Lister Institute), given intravenously, is the measure most likely to produce a specific effect, but coma, associated with cerebral oedema, may be combated with

difficult to explain its comparative frequency in the United Kingdom and Holland and its rarity in France In 1942 the incidence in Edinburgh was 1 in 21,000 vaccinated patients and in Glasgow 1 in 70,000 cases of vaccination More patients died from post-vaccinial encephalitis than from smallpox, in this outbreak (Sutherland, 1943)

Post vaccinial rashes

These may be localized to the insertion site or may be generalized, they appear after the seventh day and are allergic in origin, some possibly from streptococcal invasion and may be urticarial, morbilliform and scarlatiniform Transient bacteraemia may account for some of the petechial and pustular rashes reported (Bloch, 1942)

CONVALESCENCE AND AFTER CARE

The healthy infant is practically unaffected by vaccination and his subsequent care need raise no particular problems At the same time it is advisable to postpone vaccination or re vaccination if the patient is in any way ill, even with minor disorders such as teething or when gastro-enteritis and poliomyelitis are prevalent

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WHOOPING-COUGH

DEFINITION

children, apart from infective gastro-enteritis pertussis is the commonest infectious disease of the early months of infancy and rivals it both in fatality and incidence.

Chemotherapy

The sulphonamides are valuable in controlling secondary infection and are therefore almost invariably used in broncho-pneumonia and other inflammatory states

Antibiotics

The failure of Aerosporin (Polymyxin) to abort the disease or to effect early elimination of the causative organisms has been one of the few disappointments of antibiotic therapy Although inhalational administration has appeared in some instances to be effective when the parenteral route failed, the only series of statistical value so far recorded has returned an unfavourable verdict (Kaplan Fischer and Kohn, 1949)

The toxicity of streptomycin is a serious obstacle to its extensive use in the treatment of whooping-cough The inhalation method was used by Schwabacher Wilkinson and Karran (1949) but the therapeutic response was not convincing due possibly to the inhibitory effect on streptomycin exerted by sputum and lung extracts Experimental work suggests that aureomycin is likely to supplement polymyxin and streptomycin in pertussis therapy *Bell, Pittman and Olson (1949)* [illegible]

properly controlled series will be required for a decisive assessment

COMPLICATIONS

Convulsions

While a *single convulsion* may be a benign affair, *repeated seizures* are always dangerous The time honoured mustard bath has been supplanted by lumbar puncture, intravenous glucose (25–50 per cent solution) and 5–10 per cent calcium gluconate Sedation is maintained by chloroform and by phenobarbitone by the muscular route Some workers prefer Seconal for babies Oxygen preferably in a tent, is of value for severe cases

Bronchitis and broncho pneumonia

Although *H pertussis* can cause these complications and occasionally are the [illegible]

monary secretions, it may be found advisable to give these drugs by the [illegible] as well as by the oral and intramuscular routes, it is usual to give sulphonamides with penicillin to check the formation of penicillinase by organisms capable of producing it but this precaution is probably unnecessary with the other antibiotics Serial radiological examinations are needed to check progress because clinical examination may fail to reveal the amount of damage to the lung and especially the extent of collapse Enlargement of the hilar glands is a factor in the production of collapse especially of lobar collapse but a lobular distribution is

retarded

Intradermal tests using endotoxin derived from broken-down bacterial cells, have been used to denote sensitivity, but, as in the tuberculin reaction, the reactions are not necessarily closely related to immunity or to resistance to subsequent attack (Thompson, 1938)

DIFFERENTIAL DIAGNOSIS

Upper respiratory tract infections naturally arouse suspicion of whooping-cough most frequently, especially when the cough is persistent Enlarged tonsils, chronic catarrh, bronchiectasis and enlarged tracheobronchial glands are common causes, some nervous subjects, both in youth and adult life, have a decided tendency to paroxysmal coughing and even to vomiting whether the muco-pus is naso-

Of the less common disorders, hilar adenitis pulmonary tuberculosis, laryngismus stridulus and Hodgkin's disease may simulate whooping-cough in childhood, and mediastinal tumour, aortic aneurysm and laryngeal conditions, including hysterical paralysis, in adults

PROPHYLAXIS

General

The isolation of patients and of contacts has a limited sphere of usefulness, in a disease notorious for the vagaries of infection and escape, the imposition of segregation and quarantine restrictions covering the incubatory period of 7–14 days is hardly worth while except in special circumstances, such as special risks because of acute or chronic illness or in long stay young patients in hospitals, schools and nurseries To be effective the measure must be applied early, but the most infectious initial stage may be completely missed even when looked for in the presence of an outbreak By the time the majority have begun to whoop they are no longer infectious, but a few retain the organism for long periods and infectivity must be assumed as long as it is recoverable from the respiratory tract Disinfection of contaminated articles is advisable, for although the viability of the organism is low, secondary invaders, such as streptococci and pneumococci, may be present in the sputum and may spread infections of various kinds In general, it is best to use paper handkerchiefs or clean rags which can be destroyed by burning non-destructible articles may be disinfected by Lysol or by Cetavlon in 1–2 per cent solutions, or by steam or boiling

Passive Immunization

The serum taken from convalescent or immunized patients may be used to

CONVALESCENCE AND AFTER-CARE

Prolonged convalescence, good food, especially with high protein and fat content, and vitamin supplements are essential even in mild or moderate cases An attack of pneumonia demands follow-up with radiological examinations, and every attack of common cold or bronchitis should be treated actively In these patients each attack is liable to add its quota to the established condition of pulmonary fibrosis or even bronchiectasis.

W GUNN

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Thompson, A R (1937)

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ACTINOMYCOSIS

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seldom attacks

it is sometimes

found in carious teeth, and the cervico-facial form of actinomycosis often follows the extraction of a tooth Though it is possible that infection may be carried by inspired air to the lung, the common mode of entry into the body is *via* the alimentary tract, it may escape from the mouth into the cheek or jaw, from the stomach into the subphrenic space, from the caecum and appendix into the pericaecal ... into the paracolic and pararectal tissues, and, it is ... abdominal region

he

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organism may take the

soft swelling soon breaking down into an abscess which contains the characteristic granules

almost invariably due to blockage of the bronchioles with tenacious secretions. Fre-

raised steeply to facilitate removal, aided by the finger wrapped in gauze, in place of

cent carbon dioxide to the mixture to stimulate the respiration, in some cases nikethamide at intervals of 4–6 hours may be required Re-expansion of pulmonary collapse may be effected weeks or even months later (Nicholson, 1949) Less common complications are emphysema, alveolar and surgical, pneumothorax, lung abscess and empyema

Enteritis

The occurrence of green, relaxed stools is not infrequent in whooping-cough and in babies should always be regarded as a potentially serious condition Examination of the stool and vomit for recognized pathogens should not be omitted, even though they are rarely found The treatment is as for infantile gastro-enteritis in general (*see* page 845).

Local inflammations and affections

Various local inflammations and affections of the special senses, especially conjunctivitis, keratitis, ulcerative stomatitis, suppurative otitis and mastoiditis, cervical adenitis and impetigo contagiosa, are prone to occur, because the skin and mucous membranes appear to be specially vulnerable during and after whooping-cough

Meningo-encephalitis

Despite the frequent occurrence of meningism and symptoms referable to the central nervous system, such as convulsions, localized twitchings and paralyses, and coma, encephalitis of the type commonly associated with infectious diseases has not been encountered, the damage appears to be toxic and mechanical, largely on the vessels, rather than on nerve tissues At the same time some notice must be taken of the suggestion that mental deficiency of some degree has been attributable to the effects of whooping-cough, or at least that it followed attack (Levy and Perry, 1948) The further suggestion that encephalopathy may follow inoculations against whooping-cough is even more serious and requires further study (Byers and Moll, 1948).

Tuberculosis

The relation between activation of an antecedent tuberculous focus by an attack of whooping-cough, especially if complicated by pneumonia, is widely recognized, being more frequently incriminated than is measles or influenza in this respect. Not only may the

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weak effect, however, reports of benefit from its use have

gramme every 4 or 6 hours is a suitable dose but special care must be t

avoid toxic symptoms.

ROENTGEN RAYS

In cases which resist the sulphonamides and the antibiotics, some bene

These sometimes have the effect of soften

should

while others recommend

whenever possible, the best treat

to attempt

cases it may be necessary to remove

cations for craniotomy, which

operation may be

to restore a normal surface.

TREATMENT

If the diagnosis of actinomycosis is made early it is now possible to cure most cases Unfortunately visceral actinomycosis is very frequently not correctly diagnosed till very late, when the patient is extremely ill, and sometimes amyloid disease has supervened Too often the diagnosis is not made until it is revealed at necropsy

Much of the therapeutic teaching in the text books of ten years ago has been superseded by the use of sulphonamides and antibiotics The present-day methods of treatment can be dealt with under the following headings (1) constitutional, (2) drug treatment, (3) radiation, and (4) surgical operation

Constitutional Treatment

Extensive cervico-facial actinomycosis and particularly visceral actinomycosis cause anaemia and debility It is very important to remedy or prevent this condi-

Drug Treatment

Iodides

Until a few years ago iodine, in one or other form, was the only element which had an appreciable effect on the actinomycotic inflammatory process Potassium iodide had proved to be a specific cure for the wooden tongue of cattle at a time when this was thought to be due to the fungus of actinomyces, when at a later date it was shown to be due to an actino-bacillosis the iodides still continued to be given for both conditions Potassium iodide does have a softening effect on the hard inflammatory mass, but it is not a specific cure for actinomycosis In any case

times leads to softening of large masses, and afterwards the natural forces of the body occasionally deal with the diseased process Other forms of iodine can be used but need not here be specified

Sulphonamides

When the sulphonamides were introduced they were soon tried for cases of actinomycosis, and many successes were reported The drug which has been used

Penicillin

especially in epidemics The treatment of acute sinusitis is described on page 586, and that of broncho-pneumonia on page 415 It is of capital importance to treat the anoxia of influenzal broncho-pneumonia at the earliest possible moment

As a rule, the myocardium is damaged to a greater or less degree by the toxaemia of the influenzal infection If the heart shows any sign of failure during the acute

for a week During convalescence, it is important to watch carefully the cardiovascular response to effort

Some degree of mental depression is an almost inevitable sequel of influenza Perhaps the best prescription for this is a holiday with change of air and scene Rare complications are polyneuritis, and transient post influenzal psychosis

ROBERT COOPE

RABIES

(*See also* Tropical Diseases)

DEFINITION

Rabies is a disease due to a filtrable virus which can infect a wide range of animals, it is of world-wide distribution It has been known since the times of earliest

...ubation period,

...ion of man as a

rule is acquired from canines, and occurs through fresh wounds or abrasions contaminated with the saliva of an infected animal

A comparatively rare, and geographically limited, form of rabies which is not associated with canine infections, but is conveyed by vampire bats (*Desmodus rotundus*), occurs in Central and South America and certain of the West Indies This causes a paralytic form of the disease, which attacks especially cattle and other livestock in addition to man

AETIOLOGY

Rabies virus enters small nerves in the area of infection and slowly, by diffusion or multiplication (Septinévrite), passes up a peripheral nerve to the central nervous system It disseminates through the brain and spinal cord, and travels centrifugally down other nerves to the nerve terminals and ganglia Infected ganglion cells in the secretory organs may be shed into the secretion, and this explains the infectivity of the saliva Rabid dogs are notoriously prone to bite, and in view of the close association of dogs and man most human ... ons are caused by dog bites, nevertheless, actual wounding by biting is ... the conveyance of the infection to man, contamination of a fresh abras... ...ive saliva can give rise to the disease

SUMMARY

of iodine, or potassium iodide, or x-rays—the practitioner must remember that treatment must be prolonged, that the organism may lie latent for considerable periods and cause recurrence several months after the infection has appeared to be vanquished Particularly with visceral lesions a patient cannot be regarded as cured until he has been free from all signs of the disease for at least a year or longer

PROGNOSIS

The prognosis for the cervico-facial form of actinomycosis is very good, and the newer remedies have brought the power to control and not infrequently to cure the more serious abdominal and pulmonary forms of the disease, so long as it is realized that it may take many months or even years to eradicate the disease entirely

V ZACHARY COPE

THE COMMON COLD

pneumonia

TREATMENT

PREVENTIVE

To avoid infection during an epidemic of colds is almost impossible under modern conditions The degree of exposure may be reduced by avoiding others with colds (but most of them do not stay at home to keep their infection to them-

large, and every member of a household should have a separate towel or towels There is no convincing evidence that gargles, or the ingestion of vitamins, or vaccines have any prophylactic value

SYMPTOMATIC

The most important part of treatment, once a cold has developed, is to go to bed and to stay there until it is better The illness will take its course, and meanwhile the patient should be made as comfortable as possible The room should be warmed so that he is not breathing cold, irritating air He should have plenty of

to an ascending paraplegia of the Landry type, they are not usually fatal Their cause has not been clearly established, but their occurrence is less common after the use of killed vaccines than after that of living vaccines It is now thought that they are due to the repeated inoculations of brain tissue rather than to that of the virus In view of the possibility of these reactions and sequelae, vaccine treatment should not lightly be given

An anti rabies serum has been prepared but this, in practice, has failed to fulfil the hopes to which it originally gave rise

Once the clinical disease has developed there is little to be done other than to control the violence of the spasms by drugs The barbiturates may relieve the mental anxiety of the patient, but morphine is unsatisfactory, and may increase the excitement Anaesthesia will be necessary to relieve the distressing convulsive seizures

A. R. D ADAMS

Hogyes, A (1897) 'Lyssa", *Spezielle Pathologie und Therapie* Ed by Nothnagel, H Vol 5 Vienna Holder

Johnson, H N (1948) *Rabies in Viral and Rickettsial Infections of Man* Philadelphia Lippincott

RAT-BITE FEVERS

(*See also* Tropical Diseases)

BACTERIOLOGY

For many years it has been known that a bite by a rat, or occasionally by other animals (for example, a cat) may be followed by a relapsing febrile illness of long duration, often associated with recurring inflammation of the bite wound and adenitis, and with an evanescent eruption, severe muscular pains, and arthritis In 1916 a spirillar organism, later called *Spirillum minus*, was identified as the causative organism in certain cases of rat bite fever (sodoku) in Japan, from cases elsewhere this organism frequently was not recovered, but from some of these cases strepto

one is due to infection with *Sp minus*, and the other to infection with the organism known since 1925 as *Streptobacillus moniliformis* The initial confusion was added to by the fact that the clinical picture of both infections is remarkably similar, and their differentiation essentially lies in the identification of the causative organisms In the case of *Sp minus* this is done by infection of laboratory animals, and the recognition with the dark-ground microscope of this organism in the blood, lymph gland juice, or peritoneal fluid of the animals, in the case of *S moniliformis* infections animals cannot be infected, but blood culture from the patient on suitable

described under the name of Haverhill fever.

The incubation period of rabies in man, for a given strain of virus, is now believed largely to be governed by the innervation of the site of infection and the

[illegible]

central nervous system. In the experimental disease the length of the incubation period varies inversely with the amount of infecting virus, and is not merely

[illegible]

TREATMENT

Prophylactic

In practice this fundamentally depends on the control of the canine enzootic In many insular countries, such as Great Britain, the disease has been eradicated by such control, and the rigid enforcement of quarantine of animals from the endemic areas has prevented its reimportation Where jackals, foxes and other wild carni-

[illegible]

unknown in humans as a result of the systematic vaccination of dogs The duration of immunity in the protected animal appears to vary with the method adopted, but repeated inoculation eventually results in a solid immunity which lasts indefinitely.

General

Where rabies is endemic the risk of infection after a bite by a possibly rabid animal has carefully to be weighed As a first step the dog, when possible, should be identified and safely impounded It should not immediately be destroyed, but

[illegible]

may forestall their development, hence the reason for keeping the animal alive as long as possible. Proof of the infection in the incriminated animal confirms the need for effective specific treatment of the patient, establishment of the absence of

dose to neutralize any further toxin which is absorbed from the wound To this end, 200,000 i u should be given intravenously, *or if this is not possible, intramuscularly,* at once Only after this has been given should the wound be touched Treatment of the wound should be conservative and should aim at converting an anaerobic infection into an aerobic infection by free drainage with as little disturbance of the tissues as possible The sulphonamides and penicillin have no direct effect on tetanus [illegible]

then a further 100,000 units intramuscularly should be given at the end of a week and a fortnight

Apart from specific treatment, symptomatic measures are most important and aim at controlling the reflex convulsions which are so exhausting for the patient, maintaining strength by giving sufficient food and fluid, and promoting sleep Skilled nursing is essential and a patient with severe tetanus requires the constant attendance of at least one special nurse The patient should have a single room which should be darkened and great care should be taken to avoid all stimuli of sight, sound or touch because these excite reflex convulsions Food should be fluid but nourishing and should contain plenty of sugar and adequate salt If trismus is severe, feeding by stomach tube may be necessary and if dehydration develops, an intravenous glucose saline drip may be required When spasms are severe, the needle may be kept in place by a plaster-of-Paris splint

For ordinary sedation and to diminish nervous excitability in the early stages, large doses of bromide (for example, sodium bromide 30 grains, 4-hourly) may be *sufficient but directly reflex convulsions develop, stronger sedatives are necessary* [illegible] The former [illegible]

sary, two or three injections may be given every 24 hours until the spasms abate It *may also be given rectally in normal saline solution, in doses of 30–45 minims per* estimated stone of body-weight, once or twice daily Avertin should be given rectally in doses of from 0 07 to 0 1 millilitre per kilogram of body-weight twice or even three times daily in very severe cases Other sedatives which are useful at times [illegible]

hypodermically if the lungs become moist Pneumonia is a grave risk especially when large doses of paraldehyde or Avertin are needed and this may be lessened by prophylactic treatment with sulphonamides and penicillin from the beginning All treatment necessitating manipulation of the patient, from feeding to giving injections, should be performed when the patient is most deeply under the influence of sedatives, when reflex excitability is lessened

In the early stages, the severity of the disease can be gauged by the rate at which symptoms get worse If reflex convulsions are occurring regularly within 48 hours

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of the first onset of trismus, death will probably occur within 5 days, whatever is

once

To sum up, when adequate antitoxin has been given, there is no acute disease in which good judgment in symptomatic treatment and skilled nursing may be of greater weight in turning the scales in borderline cases

LESLIE COLE

KIDNEY AND URINARY TRACT DISEASES

ABACTERIAL PYURIA

Several diseases are included under this heading Harkness and Henderson Begg (1948) make a clinical classification under the headings of non gonococcal urethritis, abacterial, the same in association with arthritis, and abacterial pyuria without urethritis These authors obtained a *high percentage of positive cultures of pleuropneumonia like* organisms in cases of abacterial urethritis (non gonococcal) of venereal origin These organisms were also cultivated from urethral washings in 7 of 41 cases of arthritis complicating abacterial urethritis (so-called Reiter s disease)

TRUE INFECTIVE ABACTERIAL PYURIA

A group of cases with abacterial pyuria has been described by Moore (1945) under the term ' true infective abacterial pyuria "

The onset may be acute or gradual The bladder neck and posterior urethra are mainly affected and the patient's chief complaint is of increased frequency of micturition, dysuria and sometimes haematuria The urine contains pus cells and may contain blood It is sterile on culture Tubercle bacilli are never found and this distinguishes abacterial pyuria from urinary tuberculosis

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a

without effect

GEOFFREY EVANS

Harkness

Moore, T (1945) True infective abacterial pyuria,

AMYLOID DISEASE

Amyloid disease of the kidney (amyloid nephrosis) is characterized by a deposition *of amyloid substance in the media of the arteries and the glomerular capillaries* The clinical indications are oedema and gross albuminuria Chronic suppurative disease is the most common aetiological factor, but this is not always so The con- ... Conf ... with the oede- ...multiple ...pecially

the globulin fraction, may be very high

There is no specific remedy, the disease usually progressing to terminate with death from uraemia or hypertensive complication Complete recovery has been

of the first onset of trismus, death will probably occur within 5 days, whatever is done On the other hand, continuous tonic rigidity alone is not dangerous and passes off gradually in from 2 to 6 weeks Local tetanus involving the third, sixth or seventh cranial nerves in head wounds, or the motor nerves of a wounded limb, heralds a mild attack, provided that vigorous treatment with antitoxin is given at once

To sum up, when adequate antitoxin has been given, there is no acute disease in which good judgment in symptomatic treatment and skilled nursing may be of greater weight in turning the scales in borderline cases

LESLIE COLE

This operation is technically simpler and certainly much safer than the standard renal sympathectomy which involves stripping the renal pedicle

GEOFFREY EVANS

Bell, J G Yates (1949) *Proc R Soc Med*, 42, 541.
Winsbury-White, H P (1925) "The pathology of hydronephrosis" *Brit J Surg*, 13, 247

HYPOPLASTIC KIDNEYS—CONGENITAL

usually no hypertension The clinical picture is that of a very slowly progressive renal failure The symptoms are often surprisingly few, though polyuria and thirst may

is that of the general condition Nothing is gained by diet restriction, on the contrary, a good mixed diet is best Extra iron and vitamins are helpful and occasionally a blood transfusion is demanded

Obvious infection of the urinary tract should be treated at once With advances in vascular surgery the possibility of a kidney transplant may be a future treatment in cases of this type

NEPHRITIS

Bright described an acute affection of the kidneys manifested by dropsy and albuminuria, and a chronic form in which enlargement of the heart was marked but dropsy was absent In the early stages of the disease, oedema with albuminuria and varying degrees of haematuria and hypertension make a characteristic picture In the later stages, cardiovascular hypertrophy with hypertension and renal failure predominate Sometimes the course is short but in others it is of many years' duration

CLINICAL FEATURES

Ellis (1942) has distinguished two types of Bright's disease of which the following are the essential clinical features

Type I—Patients of this type give a clear history of an acute infection, *usually* of the upper respiratory tract, followed from one to three weeks later by gross haematuria, of abrupt onset, accompanied by general constitutional disturbance and slight to moderate transient oedema -

known to occur but this is unusual Benefit may result from treatment of any associated suppuration or inflammatory state Other methods of treatment include a high-protein diet, the parenteral administration of large doses of crude liver extracts, the intravenous administration of predigested proteins, for example Casydrol, and blood transfusions to rectify the anaemia.

HORACE EVANS

HYDRONEPHROSIS

Hydronephrosis is a condition of dilatation of the pelvis and calices of the kidney. It may be congenital or the result of obstruction anywhere in the urinary tract. It may also be due to disordered innervation of the renal pelvis or ureter such as occurs in paraplegic patients

Hydronephrosis is often complicated by infection, and it may also be caused by [illegible]

develops and bulges forward over the inferior branch of the renal artery carrying the ureter with it As a result, the ureter becomes kinked and compressed by the artery and this increases the hydronephrosis When the condition has reached this stage, treatment is by division of the lower branch of the renal artery and Winsbury-White advises removal of the lower pole of the kidney which the artery supplies.

TREATMENT

General

In general, the treatment of hydronephrosis consists, in the first place, of removing any obstruction to urinary flow which is present and, secondly, in clearing the urine of any infection present and keeping it sterile

Pituitrin

[illegible]

menstruation.

Sympathectomy

[illegible]

[illegible]
of [illegible]
jui [illegible]
10 a.m., 12 noon, and 3 p m ; and 4 ounces at 6 30 p m. and at 8 p m. The patient may save as much as he likes for consumption throughout the night. About 16 oranges are required to produce one pint of juice. Even young children appear to tolerate this with remarkably little discomfort. Restriction of fluid should be continued until the blood pressure begins to fall and a diuresis with lessening of the oedema occurs This usually happens within the first week, but when necessary the "starvation" regimen may be prolonged for a maximal period of about 10 days.

Rarely the raised blood pressure may not fall during this period If the blood pressure does not begin to fall within the first week of treatment, venesection should be performed, as described below. This procedure nearly always results in a fall of blood pressure and in a general improvement during the subsequent few days [illegible]

[illegible]

unnecessary to forbid the use of salt in cooking.

Focal infection

A careful search for foci of infection should be made in all patients with nephritis Inflamed tonsils, septic teeth, pyorrhoea, otitis media, and impetigo, are common findings. Such foci should be dealt with surgically if necessary, but it is sometimes difficult to decide at what time this should be done. As a rule it is better to wait until the more serious signs of the nephritis, such as hypertension and oedema, are subsiding, because an exacerbation of these not infrequently follows operation If sepsis demands urgent surgical intervention there should be no delay. Penicillin [illegible]

[illegible]

Anaemia

A moderately severe secondary anaemia develops early in most patients with [illegible]

[illegible]

daily after food.

Iron and ammonium citrate	. . .	30 gr	2 g
Glycerin	. . . . . .	15 min.	1 ml.
Chloroform water, to	. . .	½ fl oz	15 ml.

Type II—This group comprises patients who give no history of any recent acute infection, who have no recollection of passing blood, and whose only complaint is slowly progressive persistent oedema of considerable degree and insidious onset.

These two types of nephritis thus differ in their clinical features and also in the histological changes in the kidney. There is also a marked difference in their prognosis Thus, 84 per cent of patients with type I nephritis with the abrupt onset and haematuria make a complete recovery, whereas 95 per cent of those with an insidious onset eventually die from the disease

Treatment can best be discussed under these two headings in the early stage of

function.

TYPE I HAEMORRHAGIC NEPHRITIS

General management

Rest in bed and warmth are essential in the treatment of all cases of acute nephritis, no matter how mild the attack may appear The period of rest in bed depends a good deal on the progress made, but even in the least severe cases a minimum of from 4 to 6 weeks is necessary In the more severe cases rest in bed should be continued until the blood pressure is normal, the haematuria and oedema have dis-

pressure, urine volume, and weight of the patient are helpful guides to treatment.

Diet

As complete a dietetic restriction as possible undoubtedly rests not only the kidneys but the whole of the circulatory system The latter is significant in view of the fact that the modern conception of nephritis is that of a disease involving the whole cardiovascular system rather than a disorder of the kidneys alone Such

advisable

Anuria and oliguria

Complete suppression of urine is rare, but a marked degree of oliguria may occur occasionally If this persists the manifestations of true or "toxic" *uraemia develop* in association with a rising blood urea Such patients often have little or no hypertension The treatment of the condition is that advocated above for severe acute nephritis Usually a spontaneous diuresis will take place in a day or two Occasionally diuresis follows the administration of large amounts of fluid by mouth or an [illegible]

page 933)

CONVALESCENCE

During convalescence and afterwards, care must be taken to avoid infections and chills Warm clothing must be worn Cold bathing should be forbidden Provided that there are no residual manifestations, with the exception of a slight *albuminuria, no dietetic restrictions are indicated Small amounts of albumin in the* urine may occasionally persist for weeks or even months, and then completely disappear An early morning specimen of urine should be examined as occasionally what is thought to be a persistent albuminuria may really be an orthostatic albuminuria, this is not infrequent in children The administration of iron should be *continued until the blood count is normal No further treatment is usually neces*sary unless there are residual signs, such as persistent oedema, hypertension, and albuminuria, which indicate that the disease is passing into the chronic stage

TYPE II OEDEMATOUS NEPHRITIS

Profuse albuminuria may be the only early manifestation of this type of nephritis There may be noticeable frothing of the urine and the diagnosis is made by examination of the urine, or it may not be made until a later phase when oedema occurs The albuminuria may precede the onset of oedema for varying and often long periods of time As soon as the diagnosis is established a period of rest in bed and observation is advised *The duration will depend largely on the patient's* general state and the degree of oedema Observations on blood pressure, on urine output and on weight will be of value The greatest care must be taken to guard against chill and infection though the latter is a less serious threat to life in these patients since the advent of the sulphonamide drugs and penicillin

General management

The general management of this type of Bright's disease is the same as that of the haemorrhagic type This may mean prolonged rest in bed The patient and *his* relatives will be very dependent on their medical practitioner for encouragement and support because the illness is most trying Apart from mild or moderate digestive disturbances the disease is accompanied by few symptoms but the general swelling of the body, which may even involve the scalp, causes great anxiety, especially during the stage when it is steadily increasing *As time goes on the patient* becomes very depressed with the persistence of oedema, especially if it does not

In some instances of severe anaemia associated with persistent streptococcal infection blood transfusion (using packed red cells) may be indicated This must obviously be undertaken with extreme care in patients with renal disease having oedema, hypertension and haematuria

COMPLICATIONS

Acute heart failure

[illegible]

be considerably raised (150–200 millimetres of mercury) and the heart is dilated as shown by the apex beat, which is displaced outwards, even as far as the anterior [illegible]

tion" regimen In patients with heart failure, additional measures are called for. Of these measures, venesection and the administration of morphine and strophanthin are the most helpful About 400 millilitres of blood should be withdrawn from a [illegible]

every 6 hours. If the patient is a child the doses of these drugs are modified according to age.

Hypertensive cerebral attack

Severe headache, convulsions, coma, amaurosis, and other evidences of diffuse or focal disturbances in the brain, may occur in association with acute nephritis [illegible]

the cerebral circulation.

Venesection and lumbar puncture are the most valuable methods of treatment. A small venesection is generally useless, about 400 millilitres for a child and 600 millilitres for an adult are the amounts of blood which should be withdrawn Lumbar puncture often relieves the intense headache This procedure should be [illegible]

present

SAMPLE DIETS

SCHEMM S DIET No 1 (6 feeds per day)

	Amount in oz	*Diet Acid-ash salt poor*	*N/10 Acid*	*N/10 Alkali*	*Sodium mg*
6 0 a m.	6	Porridge (salt free)	24 0		6 6
	3	Milk		24 0	42 6
9 0 a m.	2	Whole egg (or fish 2 oz.)	66 0		67 5
	4	Milk		32 0	56 8
12 noon	3½	Plums	+		1 4
	1	Bread (salt free)	9 0		1 4
	½	Butter (salt free)	0 5		?
	7	Milk		56 0	99 4
3 30 p m	1	Sponge cake	30 0		23 0
	1	Bread (salt free)	9 0		1 4
	½	Butter (salt free)	0 5		?
	2	Milk		16 0	28 4
6.30 p m.	2	Egg (or 2 oz. fish)	66 0		67 5
	1	Bread (salt free)	9 0		1 4
	½	Butter (salt free)	0 5		?
	6	Milk		48 0	85 2
9 0 p.m	8	Milk		64 0	113 6
	2	Egg custard	66 0		67 5
	2	Bread (salt free)	18 0		2 8
	½	Butter (salt free)	0 5		?
		666 5 mg sodium = 1 7 g sodium chloride	299 0	240 0	666 5

Patient to drink 3,000 ml water in 24 hours, or more

SCHEMM S DIET No 2

	oz	
Breakfast	6	Salt free porridge
	1½	Salt free bread (portion of butter)
	4	Milk
	1	Egg
	½	Sugar
Dinner	2	Meat or fish or rabbit
	3	Vegetables
	2	Potatoes
	6	Milk pudding, one egg
Tea	2	Milk
	2	Salt free bread (portion of butter)
	½	Jam
Supper	1	Meat or alternative
	2	Milk
	1	Salt free bread (portion of butter)
	1	Lettuce or tomato or 4 oz stewed apple or pear
	½	Sugar

Total butter in 24 hours = 1 oz. (divided into three portions)
Total sugar in 24 hours = 1 oz

respond to treatment and he complains of general weakness and irritability The medical practitioner must take a sanguine view in order to help the patient through the illness, and he must maintain this outlook as long as possible, not only for the reasons already given but also because a small proportion of patients suffering from this disease even after many months of illness, may make a remarkable and complete recovery which is permanent

Diet

long run may take more protein if it is given as part of an ordinary mixed diet Fluid and salt restriction may be helpful, and in the average case the daily intake of fluid is not allowed to exceed two pints restricting it to the minimal amount on which the patient can remain comfortable without undue thirst Added salt is forbidden but the ordinary amounts used in cooking are permitted

This restriction of fluid intake is not, however, recommended by Schemm (1942) whose diet may on occasion be as effective in the treatment of the oedema of

addition The object of the acid ash diet is to neutralize the alkaline oedema fluid collected in the intercellular tissue spaces A large fluid intake is given to facilitate the excretion of the sodium salts liberated from the oedema fluid by the acid producing diet A true cellular dehydration may exist in spite of the fluid retention in the inter-cellular spaces

Schemm (1944) emphasizes the value of a high fluid intake in "nephrotic oedema" He even suggests that the symptoms of pulmonary cerebral and retinal oedema are not directly related to the simple volume increase in the interstitial fluid that is called oedema, but may be more directly related to cell injury from cell anoxia or even cell dehydration To correct this disturbance of protein, water and electrolyte balance, he advises a minimal intake of salt and a maximal intake of plain water

The writer has a limited experience of the value of this treatment in cases of massive oedema and albuminuria due to type II nephritis Massive oedema which has been stationary for weeks or months may clear rapidly and almost completely on a fluid intake of 3–4 litres daily (Schemm advises even larger fluid intake) and an acid ash diet as shown on page 924

For further details Schemm s original papers should be consulted This treatment should only be undertaken in a hospital where the patient can be kept under close observation because there is a risk of causing uraemia by a too great salt restriction in a patient with impaired renal function Furthermore, if the oedema tous patient takes salt when having large quantities of fluid, the oedema may be seriously increased Lastly, the treatment is not always successful and therefore careful observation must be made and records kept of fluid intake and urine output, and the treatment should be controlled by estimations of serum sodium plasma chloride and 24-hour excretions of urine chlorides

of this sheet is to act as a gutter in which to drain the fluid away It is therefore supported by long sand bags parallel to the legs, and is drawn over the end of the mattress to drain into a bucket at the foot of the bed The enclosing sterile towels are now removed from the legs and the skin is thinly covered with penicillin cream

The instrument used for the operation is a narrow tenotomy knife to which a "guard" is applied at about ⅜ inch or 1 centimetre from the tip Twenty incisions are rapidly made in each leg through the penicillin cream Four parallel rows of five wounds running down the leg are made from a level just below the knee joint to just above the ankle joint Two further incisions may be made on the dorsum of [illegible]

The operation is almost painless, as one might expect from the tension of the skin, but it is less distressing to the patient under the influence of morphine or one of the barbiturates, alternatively the patient may be given Pentothal

LATE STAGE. CHRONIC NEPHRITIS

[illegible] It from the develop- [illegible]

increasing anaemia brings about a more gradual deterioration The progress of the disease is unfortunately inevitable in all cases and treatment must be largely symptomatic

General management

[illegible] depend largely on the degree of heart [illegible] pro [illegible] state [illegible] which directly influence the course of the disease Iron is usually given for the anaemia but is rarely effective It remains to be seen whether intravenous iron will be of value The only effective treatment for the anaemia is blood transfusion This procedure is purely palliative and must be a matter for decision in individual cases The risk of precipitating pulmonary oedema must be borne in mind

Diet

The main problem consists in overcoming the anorexia and in most cases a light vegetarian type of diet is best *It is doubtful whether drastic protein restriction* really helps and it is usually wise to allow these patients whatever they like and can take without upset Unless oedema is present salt restriction is not necessary As there is polyuria the fluid intake should be unrestricted

HEART FAILURE

Left ventricle failure may cause symptoms varying from attacks of nocturnal dyspnoea to pronounced pulmonary oedema with gross cardiac failure Oedema of

OEDEMA

The management of the oedema is usually the main problem in this type of nephritis Reference has already been made to the dietetic regimen Often with rest and diet a spontaneous diuresis may occur Similarly an incidental fever may

[illegible]

jection of 2 millilitres two hours after the oral administration of 30 grains of

[illegible]

recorded This treatment if it results in a satisfactory diuresis may render patients oedema free and enable them to be up and about instead of being waterlogged and confined to bed In resistant cases of gross oedema multiple punctures of the legs may give good results The risk of infection is minimal now that penicillin can be used By adequately puncturing the lower extremities pleural effusions and ascites may be drained completely through the legs

Acupuncture

The head of the patient's bed is raised on 12 inch or 18 inch blocks so that the fluid gravitates to the legs if a cardiac bed is available the patient lies in it with the head raised and the feet lowered In order to accelerate gravitation of fluid he may be allowed from time to time to sit on the edge of the bed or be supported in an arm-chair with the legs dependent It is important for subsequent successful drainage that one should patiently wait for the legs to become really solid with oedema When the time is ripe for acupuncture, the skin on the shins is usually tense and

[illegible]

before proceeding to drainage The operation of acupuncture fell into disuse

[illegible]

Technique—A course of penicillin, 250,000 units twice daily, is given the day before acupuncture and continued until drainage has ceased The skin of the legs, from well above the knees down to the toes, is then prepared as for a surgical operation, it is shaved, washed painted and subsequently repainted with spirit, and finally wrapped in sterile towels A previously sterilized long mackintosh rubber sheet is placed under the legs, the upper end being at mid thigh level The purpose

of this sheet is to act as a gutter in which to drain the fluid away It is therefore

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LATE STAGE CHRONIC NEPHRITIS

The symptoms in the late stage of both types of nephritis result from the development of hypertension, renal failure and cardiac failure in varying degree In some cases the hypertensive syndrome is prominent and the terminal phase may be with rapid vascular deterioration In other cases a slowly progressive renal failure with increasing anaemia brings about a more gradual deterioration The progress of the disease is unfortunately inevitable in all cases and treatment must be largely symptomatic

General management

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digitalis leaf, ½ grain, 3 times daily, or tablets of Digoxin (*B P*), 0 25 milligrams, twice daily The mercurial diuretics may be used as in other cases of left ventricle failure, particularly for the relief of pulmonary oedema Providing that a satisfactory diuresis results 2 millilitres of Neptal, Mersalyl or Salyrgan, may be given intramuscularly every 3 or 4 days Venesection is another method of relieving the pulmonary oedema but is not to be advised if the anaemia is marked Morphine should be used if there is distress and alternatively, Omnopon, which may be less

removal of a few millilitres of cerebrospinal fluid may be helpful if the pressure is high Rectal infusions of magnesium sulphate, 5 ounces of a 25 per cent solution, can be tried The potassium thiocyanate treatment often relieves severe headache Vomiting in chronic nephritis may be due to different causes It may be hypertensive, in which case lumbar puncture will afford relief It may be due to the use of morphine or digitalis, or it may be the effect of a true toxic uraemia In this latter case relief is difficult The most satisfactory method of control is by frequent gastric lavage, using a Ryle's tube

The operation of dorsi lumbar sympathectomy has been used in some cases of chronic nephritis as an aid in controlling the hypertensive symptoms, occasionally with very satisfactory results In severely ill patients, the injection of phenol into the ganglia may give some temporary relief

Ellis, A (1942) *Lancet*, 1, 1, 34 72
Schem

POLYCYSTIC DISEASE—CONGENITAL

Polycystic disease of the kidney is a fairly common congenital abnormality The disease is usually bilateral and, although occasionally seen in the infant, is most commonly discovered in the adult between the ages of thirty and fifty It

In most cases the treatment is similar to that of chronic nephritis If there is infection this must be dealt with as in pyelitis When haemorrhage occurs complete rest is to be advised If the haemorrhage is severe, blood transfusion is often demanded and may result in great benefit Surgical procedures such as puncture of

the cysts to relieve pressure on the remaining parenchyma have proved unsuccessful. When there is no serious complication death from uraemia is usual about the age of fifty, though some patients live to a greater age

STAPHYLOCOCCAL INFECTIONS

KIDNEYS

Staphylococcal Pyaemia

In severe staphylococcal pyaemia, such as may be due to acute osteomyelitis, the cortex of both kidneys may be studded with minute abscesses The kidney disease is part of the general pyaemic process and it is only recognized *post mortem*

Perinephric Suppuration

The lesion is an abscess in the perinephric tissues caused by *Staphylococcus aureus* It is a blood borne infection due to a furuncle or carbuncle, or the staphylococcus may gain entry to the body through an infected corn or blister Patients with perinephric suppuration generally give a history of a skin infection between two weeks and two months previously The interval between the primary and the metastatic infection may be longer, on the other hand, the infections may coexist It is therefore important in the treatment of this disease to make a careful search for the primary infection and, if it is still present, to eradicate it, furthermore, a *S albus* which has assumed pathogenic properties may be the causal organism, and the primary infection may be in one of the paranasal sinuses (Ryle 1938) or elsewhere in the upper respiratory tract where this organism is a normal inhabitant, as it is on the skin

The immediate cause of perinephric suppuration is almost certainly a cortical abscess close under the capsule at one or other pole of the kidney The perinephric tissues are infected by direct spread of the infection through the renal capsule or the cortical abscess may rupture the capsule, discharge its contents into the perinephric tissues and itself heal On the other hand the cortical abscess may persist even after the perinephric abscess has been drained and healed, and so necessitate subsequent nephrectomy

Treatment

The lessons to be learnt from this understanding of the pathogeny of perinephric suppuration are as follows (1) any possible primary focus of infection must be eradicated, and (2) early diagnosis is of greatest value because with modern remedies perinephric suppuration may be forestalled

General management —The patient is nursed at rest in bed and the general treatment for an acute infection is prescribed

Medicinal treatment —Many strains of staphylococci are sensitive to sulpha

4 hours by mouth, 8 grammes on the first

Procaine penicillin is given simultaneously

cent *w/v*,

obtain a

Given in

ound that

the failure is with normal rhythm The best preparation in these cases is powdered digitalis leaf, ½ grain, 3 times daily or tablets of Digoxin (*B P*) 0 25 milligrams, twice daily The mercurial diuretics may be used as in other cases of left ventricle failure, particularly for the relief of pulmonary oedema Providing that a satisfactory diuresis results 2 millilitres of Neptal, Mersalyl or Salyrgan may be given intramuscularly every 3 or 4 days Venesection is another method of relieving the pulmonary oedema but is not to be advised if the anaemia is marked Morphine

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urethra or it may require drainage through the perineum Acute and chroni *prostatitis* are dealt with in detail in surgical text-books and the reader is referre to the work of Maingot (1936)

Ball, G (1938) "Staphylococcal infections of the kidney" *Brit J Urol*, 10, 323
Maingot, R (1936) *Post Graduate Surgery* Vol 2, p 2954 London Medical Publications
Ryle, J A (
Thomas, E
Toggart, S
Olansky,

TUBERCULOSIS

Tuberculosis of the kidney is always secondary to active or latent tuberculosis elsewhere in the body The common symptoms of renal tuberculosis are increased frequency of micturition, lumbar discomfort or pain, and haematuria The disease is to be suspected in the presence of sterile, often microscopic, pyuria Its presence is confirmed by the finding of tubercle bacilli in the urine, or by guinea pig inoculation It may also be recognized by cystoscopy when the bladder is involved, and by radiography These observations must be confirmed by finding tubercle bacilli in the urine

Renal tuberculosis leads to tuberculous disease of the ureter and bladder It is often complicated by tuberculous infection of the prostate, seminal vesicles and epididymis, and there is good reason for the opinion that renal tuberculosis precedes genital tuberculosis as a rule (Borthwick, 1947)

With regard to the presence of tubercle bacilli in the urine, it is generally accepted that their presence is evidence of renal tuberculosis, but there is reason to believe that small lesions of the kidney may heal Jennings Marshall (1945) has pointed out that urinary tuberculosis is not a fulminating lesion, but only slowly progressive, and that its progress is open to precise observation by repeated examinations of 24-hour specimens of urine, intravenous pyelography and cystoscopy

TREATMENT

For the reasons just given, and in the absence of patent or gross renal tubercu

disease is unilateral, nephrectomy should be performed

grossly diseased kidney should be removed when the lesion in the opposite kidney is only slight may be difficult to decide, but it was Girling Ball's opinion that as a rule it would seem best that these cases should be treated on conservative lines (Ball and Evans 1932)

Sufficient knowledge is not yet available as to the value of *streptomycin* and dihydrostreptomycin in this disease Streptomycin may at least play a useful part in minimizing the risk of post operative sinus formation The usual routine is *to give 1–1½ grammes of streptomycin for 10 days beginning a few days before* operation Wells (1949) summarizes the present position with regard to the use of

RENAL CARBUNCLE

In this uncommon disease the lesion is an abscess in the renal cortex Its pathogenesis has been described under perinephric suppuration For further information on this subject the reader is referred to a paper by Ryle (1938)

In so-called renal carbuncle the abscess in the kidney persists It neither undergoes resolution nor discharges into the perinephric tissues or if it empties into the perinephric tissues it does not heal It may be that in renal carbuncle the abscess is initially located deeper in the cortex than the subcapsular abscess that commonly causes perinephric suppuration

Treatment

The treatment indicated is nephrectomy provided the opposite kidney is healthy If there is any doubt as to the diagnosis or if there is reason to believe that the abscess is small or not fully developed a fair trial should first be made of medicinal treatment namely the combination of sulphathiazole by mouth and penicillin by intramuscular injection

PROSTATE

A staphylococcal pyaemia may lead to prostatic abscess the pathogenesis of which is the same as that described under the heading of perinephric suppuration with which disease it may be coincident In addition it may be caused by instrumentation

Treatment

Treatment is with rest in bed and the application of hot compresses to the perineum Sulphonamides and penicillin are given as previously advised (*see* Peri

morning

Differential diagnosis

The nature of the infection may be determined by bacteriological examination of the prostatic secretion A gonococcal infection secondary to a posterior urethritis is the commonest cause of a prostatic abscess Other common sources of infection are *Bacillus coli* streptococci and *Proteus vulgaris* Acute prostatitis may be complicated by retention of urine A prostatic abscess may discharge into the

RENAL CAUSES

Acute renal failure, due to renal causes, occurs in (a) acute tubular nephrosis (b) bilateral cortical necrosis and (c) acute nephritis, especially in Ellis type 1 nephritis

Acute tubular nephrosis

This is a group of conditions in which damage to the renal tubular cells, varying in severity from temporary inhibition of function to necrosis, results in renal failure characterized clinically by nitrogen retention and anuria or oliguria with low specific gravity urine In all instances, whatever the aetiology, recovery of renal function is possible, even necrosed epithelium becoming completely replaced Anuria or oliguria may last as long as 3 weeks, but usually less than 14 days From the time of onset of diuresis there may be a further period of a week or more with virtually absent concentrating ability of the tubules Very nearly normal renal function, as judged by special tests, returns in a period of 3-9 months

Such damage to the renal tubular epithelium can occur after mismatched trans fusion, or any other cause of intravascular haemolysis, as a result of ischaemia as in shock, or other causes of hypotension such as haemorrhage or dehydration, or from direct toxic action as by mercury, carbon tetrachloride and other cell poisons The acute tubular nephrosis complicating abortion in the third or fourth month of pregnancy may have a toxic, a hypotensive or a haemolytic aetiology, or a com bination of these factors

In the past, treatment has been by decapsulation of the kidneys to relieve in creased intra renal tension, by splanchnic block or spinal anaesthesia with the object of relieving renal arteriole constriction, and by the administration of diuretics to promote urine flow Among the diuretics generally used have been large quantities of fluid by mouth, tap water, or normal saline solution per rectum intravenous

methods were used for the removal of these toxic bodies, of which methods the artificial kidney (Kolff and Berk, 1944) and peritoneal irrigation (Frank, Seligman and Fine, 1946) have been most used More recently intestinal dialysis has been employed Although the survival of many patients with acute uraemia treated by dialysis has been reported these procedures in themselves carry risks and require very careful biochemical control

The treatment of acute tubular nephrosis to be described is based on the premise that the excretion of small quantities (oliguria) of low specific gravity urine in some cases, and the complete anuria lasting a number of days in other cases is due to

because the anuria is due to degeneration or death of the tubule cells Further, it is

streptomycin in the opinion that "one gramme daily is the minimum consistent with good results and that a period of 120 days is optimal" This paper should be consulted for further information on the subject

[illegible]

HORACE EVANS

URAEMIA

Uraemia may be defined as a disturbance of composition of the body fluids accompanied by nitrogen retention resulting from renal failure Many individual substances such as the phenols have been incriminated as mainly responsible for the complex clinical picture of uraemia Certainly in acute uraemia it is now apparent that retention of only two substances can be correlated with a fatal outcome namely water and potassium The terminal picture of chronic bilateral renal disease when death results from renal failure is very similar to that of acute uraemia and it may be impossible without an adequate clinical history to differentiate the two conditions in life

The treatment of both acute and chronic renal failure is essentially the same and aims at maintaining the composition of the body fluids as near normal as possible, [illegible]

ACUTE RENAL FAILURE

Fishberg (1944) groups cases of acute renal failure under three headings namely (i) pre renal (ii) renal and (iii) post renal

PRE RENAL CAUSES

Pre renal failure is due to a fall in blood pressure to an extent which reduces the filtration pressure in the glomeruli below its effective level The causes of a severe and prolonged fall in blood pressure are haemorrhage dehydration and shock The compensatory vasoconstriction includes the renal vascular bed and the renal blood flow may be reduced out of proportion to the fall in systemic blood pressure

The treatment of acute renal failure due to pre renal causes is the treatment of these conditions loss of blood dehydration and shock (*see* pages 87, 531 and 251)

POST RENAL CAUSES

The post renal cause of acute renal failure is obstruction to the flow of urine in the ureters bladder or urethra such as may be caused by crystallization of sul[illegible]

and washing out of the renal pelves

[illegible]

cause of a lowered blood pressure, the ability to excrete a large urinary volume is permanently or temporarily lost If this is the result of loss of renal tissue progressive nitrogen retention and mineral and water balance disturbance are inevitable and death will ensue If, however, the deterioration of renal function is the result of a non-renal complication, successful treatment of the latter will restore renal function to its previous level

It will be seen that therapeutically, chronic renal disease may be divided into three stages

Stage I—Reduced renal reserve, but no significant nitrogen retention or disturbance of mineral balance

Stage II—*Nitrogen retention, probable disturbance of mineral balance Urine specific* gravity fixed Ability to excrete sufficient water to compensate for the lack of concentrating power, is retained

Stage III—Maximum 24 hours urine volume falls to levels quite insufficient to compensate *for the fixed specific gravity*

The separation of stages I and II is artificial as the presence or absence of nitrogen retention may depend on the management of the patient

STAGE I

T[illegible] and by subsequent investigation of [illegible]

gravity is fixed, protein intake should be limited and a large daily urine flow ensured as for stage II

STAGE II

Three-quarters of the work performed by the kidneys in secreting is used in excreting urea This work is required in reabsorbing water without urea by the tubules, and is diminished by a diuresis most of the benefit of a diuresis is obtained [illegible] 24 h[illegible] of 3 litres the small gain by increasing the urine [illegible]

of urea with a 3 litre volume, or the equivalent of from 54 to 63 grammes of prot[illegible] intake The basis of treatment of uncompensated renal disease should therefore be a high fluid intake, to ensure a daily urine output of about 3 litres, with a protein intake of between 0 5 gramme and 0 75 gramme per kilogram of body-weight [illegible] vita- [illegible] ly of [illegible] large [illegible] hen a

therefore, must not exceed 1,000 millilitres in 24 hours Any urine excreted is measured and the fluid intake is increased by a corresponding amount The patient is treated with a continuous intragastric drip Through a small bore indwelling stomach tube the following mixture is given slowly during the 24 hours

Glucose	14 oz.	400 g
Arachis oil	3½ oz.	100 g
Acacia enough to emulsify		
Water	1¾ pints	1 litre

The whole object of this treatment is to keep the patient alive until the tubular epithelium regenerates and a spontaneous diuresis takes place

As soon as the urine output exceeds one litre in 24 hours, the gastric drip is stopped and the patient is fed by mouth with a high-calorie low protein diet containing ample mineral salts The provision of ample mineral salts is important because for a week or more after recovery sets in there is a real danger of electrolyte deficiency

If a patient is seen within a few hours of ingestion of a heavy metal full doses of BAL should be given

Bilateral cortical necrosis

This is a rare condition which is most commonly a complication of concealed accidental haemorrhage Treatment is the same as that for acute tubular nephrosis The prognosis is far graver because regeneration of the necrotic tissue does not occur, and survival is only possible if sufficient kidney tissue is spared

Acute nephritis complicated by anuria

A certain differential diagnosis from acute tubular nephrosis cannot be made during life The treatment of acute nephritis is described on pages 919, 922 and 926 Only in rare cases, when the onset of the disease is immediately accompanied by marked oliguria or even anuria, is the treatment for acute tubular nephrosis prescribed

CHRONIC URAEMIA

Whatever the underlying pathology in chronic bilateral renal disease the functional impairment of the kidneys runs to much the same pattern although varying enormously in its rate of development At first the destruction of renal tissue can

ability to excrete large volumes of water is retained the kidneys can compensate

URINARY INFECTIONS

Acute urinary infections give rise to clinical syndromes according to the part of the urinary tract which is chiefly affected This section is chiefly concerned with *pyelitis*, pyelonephritis and cystitis In any infection of the urinary tract a detailed examination of the whole genito-urinary system must be made, because, for instance, diseases of the prostate gland which cause enlargement of the gland or stricture of the urethra may prevent complete emptying of the bladder and may predispose to urinary infection, prostatitis may be the infective focus primarily responsible for a urinary infection, tuberculous epididymitis and tuberculous infection of the seminal vesicles may lead to the diagnosis of tuberculous disease of the kidney or bladder

Chronic low-grade infections of the urinary tract may exist in the absence of local symptoms such as backache (pyelitis and pyelonephritis), increased frequency of micturition, urgency and painful micturition (cystitis), and yet cause debility, asthenia and febrile disturbance Further chronic symptomless urinary infection may be the cause of recurrent attacks of acute disease of the urinary tract, such as pyelitis and cystitis Therefore, after a course of treatment for a urinary infection, the fact of the treatment having been successful must be established by a bacteriolo [illegible] If the patient has been treated [illegible] ks [illegible] ary [illegible] [illegible] page 1314)

PREDISPOSING CAUSES

The predisposing causes of a urinary infection are important because they generally prevent successful treatment and even if the treatment is successful symptomatically their presence determines a relapse The predisposing *causes include* (1) obstruction to the flow, or hold up, of urine in any part of the urinary tract, such as occurs in hydronephrosis, hydro ureter, obstruction to ureteric flow, as for instance by a calculus or during pregnancy; *bladder diverticulum, prostatic obstruction* and urethral stricture, (2) diseases of the urinary tract such as calculus or neoplasm, (3) injury to the urinary tract by instrumentation or otherwise, (4) diarrhoea in women, *though not in men, appendicitis, especially if the* appendix is close to or attached to the right ureter, and perhaps infections of the gall bladder; (5) debilitating states, including anaemia, which predispose to urinary infection *hence it is common in the last stages of many wasting diseases,* and in these it is of little other than prognostic significance, that is to say, sterilization of the urine does not noticeably improve the patient's condition

One infection may predispose to another Tuberculosis of the urinary tract may be complicated by a *B coli* infection A streptococcal infection seems to predispose to a *B coli* infection After the urine has been cleared of *B coli* a residual *S faecalis* infection may be found and unless this is removed by treatment the

high salt intake is the easiest way to ensure that a patient maintains a large fluid intake, both purposes may be served by giving 10 grammes of sodium chloride in the day This allows for a 300-milligram per cent content of salt in the 3 litres of urine Sodium chloride should be given with, or immediately after meals When given in these large doses it is conveniently prescribed in 1 gramme capsules or cachets

At some stages in chronic renal failure particularly in chronic nephritis there is a tendency to sodium retention and oedema In such cases it is obvious that only as much salt should be given as is lost in the urine which can easily be assessed by performing the simple Fantus (1936) test on a 24-hour specimen of urine

Anaemia frequently complicates chronic renal insufficiency This can only be corrected by occasional transfusion, preferably of packed cells, and is little affected by iron administration A negative calcium balance is common and it is advisable to give added calcium lactate Whether administration of alkalis, to attempt to correct acidosis has much value is debatable Certainly in the renal failure seen with chronic alkalosis it is essential that no alkalis which can be absorbed from the intestinal tract should be given

In summary, an uncompensated chronic renal failure should be treated as follows (1) high fluid intake to ensure a 24-hour urine volume of about 3 litres, (2) protein intake of from 30 to 50 grammes daily with a high-calorie diet, (3) salt intake of 15 grammes daily, and (4) correction of anaemia and prevention of negative calcium balance

It is possible for a patient with uncompensated renal failure to remain relatively well for long periods with a blood urea of 100 milligrams per cent or more Although drastic dietary restrictions may reduce the blood urea, this is not to be advised

If chronic urinary tract infection is the basis for the renal damage this must be actively treated Once the infection is cleared up, small daily doses of the sulphonamides may prevent recurrence of the infection and further deterioration of the renal condition For this purpose, sulphathiazole 0 5 gramme twice daily, or even as little as 0 1 gramme four times daily, has been found effective

STAGE III

With the on[illegible]sly damaged kidneys the same [illegible]atment described for this, the [illegible] protein free and mineral free diet, may tide a patient over an exacerbation of a chronic renal failure It is not permissible to maintain a patient alive on such treatment if there is no hope for some degree of recovery of renal function To relieve his distress a patient dying of uraemia should be fully sedated with paraldehyde, barbiturates or hyoscine

GEOFFREY EVANS
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Bull G M, Joekes, A M, and Lowe K G (1949) *Lancet* 2, 229.
Ellis, A (1942) *Lancet*, 1, 1, 34, and 72
Fantus, J B (1936) *J Amer med Ass*, 107, 14
Fishberg, A M (194[illegible]
Fr[illegible]
Ko[illegible]
Lu[illegible]

...does not take sulphonamide, the urine is again examined bacteriologically

If the urine is still infected, the urinary tract should be examined in detail, namely, by intravenous pyelography, if necessary followed by cystoscopy and retrograde pyelography In addition to local diseases affecting the genito-urinary tract, a general examination of the patient is essential and the medical practitioner is reminded that a *B coli* infection of the urinary tract may be the first and perhaps only indication of an underlying tuberculous disease Any complicating disease or predisposing cause disclosed by this examination must be dealt with and, if possible, eradicated

REVIEW OF STERILIZING AGENTS

The choice of remedies for sterilizing the urine depends on the nature of the infection A sulphonamide is the first choice It is generally effective in *B coli* and staphylococcal infections unless one of the predisposing causes to urinary infection is present...

safety Rarely a *B coli* infection is sulphonamide resistant and penicillin sensitive, and it is then, of course, treated with penicillin Penicillin is advised for the treatment of *S faecalis* Penicillin used to be given in large dosage for the treatment of proteus infections Chloromycetin, however, seems to be a better remedy With further experience of its use a smaller dose may prove effective The present dosage of Chl...
the sec...
8-day...
doses It is given in 250-milligram capsules and the following scheme has proved effective, although the interval between evening and morning dose is more than 8 hours On the first day the treatment is 7 a m , 4 capsules 2 p m and 6 p m , 2 capsules, 10 p m , 4 capsules, making a total of 3 grammes on the second and third day, 2 capsules at the same times to total, 2 grammes, later 1 capsule at 7 a m , 11 a m , 2 p m and 6 p m , and 2 capsules at 10 p m , to total 1½ grammes Streptomycin may sterilize urine infected with *B coli*, even in the presence of...

sterile at the end of 72 hours it is probably no good continuing with streptomycin It is disappointing that the urinary infection both in complicated and uncomplicated cases may return within 48 hours, and the infecting micro organism may then be resistant to streptomycin Aureomycin may prove to be an effective urinary disinfectant It is now within the province of the pathologist to advise the clinician

B coli infection is likely to recur, but if the urine is sterilized completely recurrence may be prevented

TREATMENT

Acute Infections

Acute infections of the urinary tract with *B coli* take a varied clinical form A sudden onset with rigor, headache and vomiting and severe constitutional disturb ance with urinary symptoms is characteristic Immediate steps should be taken to determine the nature of the infection by bacteriological examination of a mid stream specimen in a male subject and a midstream catheter specimen in a female Whenever it is possible an ordinary midstream specimen of urine should be collected from a female subject it is becoming increasingly evident that catheteriza- tion should be avoided Without waiting for the results of the bacteriological examination of the urine, the patient is put to bed and given alkali in sufficient quantity to render the urine neutral if, as is usually the case, it is already acid The

unless renal function is seriously impaired, or unless there is anaemia or vomiting As there is not a wide margin between the therapeutic dose and the toxic dose of sodium bicarbonate in some cases, the urine reaction should be watched by testing its acidity with litmus paper, and as soon as the urine is alkaline to litmus paper the administration of bicarbonate is reduced by giving it every 3 or 4 hours If the urine is initially acid a sulphonamide is given, namely, Sulphamezathine, 1 gramme 4-hourly, or sulphamerazine, 1 gramme 8 hourly The fluid intake should be 4–5 pints daily If the urinary excretion is below this level the sulphonamide dosage must be reduced to avoid the risk of the deposition of crystals in the tubules and renal pelvis Sulphamezathine, sulphamerazine, sulphathiazole, and sulphadiazine and their acetyl derivatives are much more soluble in alkaline urine Therefore, to prevent crystallization, sufficient alkali should be given to bring the urine pH to 7 5 It may be advisable, therefore, to postpone the administration of a sulphon amide for the first 24 hours until the urine has been rendered alkaline and the excretion of urine carefully measured and recorded If the urine is alkaline before treatment is begun it is an added reason for the delay in giving a sulphonamide, because alkaline urine suggests a proteus infection The usual general treatment for a patient suffering from an acute febrile illness is prescribed When the nature of the infection has been determined the sulphonamide or antibiotic to which the infecting micro-organism is sensitive is given Streptomycin will probably prove to be the best initial remedy for acute infections of the urinary tract

Chronic Infections

In a chronic infection by *B coli*, treatment with sulphacetamide is advised

bath and toilet purposes, and morning and evening when his bed is made An

with calcium oxalate or calcium phosphate calculi and inactivity, such as prolonged rest in bed, which promotes decalcification of bone, must be avoided as far as possible

Conclusion

The importance of these several factors varies in different cases of urinary lithiasis It is probable that in any single individual several coincident factors are initially operative at the same time For example, stone formation is common in patients who, on account of a fractured femur or of paraplegia, have to lie in bed In these patients urinary stasis plays a part, they must be nursed on the side as much as possible, lying part of the day on the face As soon as possible they must be up and moving about Urinary infection must be looked for repeatedly at [illegible]

at present unknown This is illustrated by the present frequency of calcium oxalate stones, containing also some phosphate, which are formed in the kidney and are frequently passed down the ureter, sometimes obstructing it, if they reach the bladder they are sometimes passed per urethram and sometimes remain in the bladder Grossmann (1938) has described this kind of stone formation as being very frequent recently, and characterized by the following clinical features It is more common in men than in women it occurs chiefly in patients between the ages of 20 and 35 years, generally speaking, a single calculus is formed and it is characteristic of the disease that it is rarely recurrent The aetiological factors which determine this type of stone formation are not known

REMEDIAL TREATMENT

Medical

belladonna to the limit of his tolerance, say 7½ or 10 minims, 4 times in 24 hours The same treatment is prescribed for a stone in the ureter This treatment may be successful and may be persevered with for several months provided that there is no evidence of ureteric obstruction nor increasing hydronephrosis, and provided that urinary infection, if present, can be kept under control A small stone lying in a calyx is best left alone

Surgical

A stone in the bladder which is too large to pass by the urethra should be treated surgically A stone in the ureter, if stationary after several months of medical treatment, should be removed by operative cystoscopy or by open operation, according to the circumstances of the case A stone in the renal pelvis which is too large to pass through the ureter should be removed by pyelolithotomy

as to the sensitiveness of the infecting micro-organism to the several sulphonamides and antibiotics named above

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Harris, I, Vernon, C. E, Jacob, N, and Roberts, M E. (1949) *Lancet*, 2, 283.

URINARY LITHIASIS

INTRODUCTION

The causation of stones in the urinary tract is still an obscure problem in some [illegible] patient than has been the practice in the past, both in regard to the patient's past history and present condition, and the chemical examination of the stone if possible

The fact is that with present day methods of treatment a single stone does not often present much difficulty, the real danger and difficulty of urinary lithiasis depends on multiple stone formation and recurrence

PREVENTIVE TREATMENT

Urinary Stasis

Stagnation of urine in any part of the urinary tract is a well known precipitating cause of stone formation, congenital diseases such as hydronephrosis, ureterocele and diverticulum of the bladder are examples of this Acquired stasis may be due to trauma such as may lead to narrowing of the pelvi ureteral junction, stricture of the ureter, post prostatectomy obstruction of the outlet of the bladder, urethral stric [illegible]

had, a stone in the urinary tract, and in the examination of the films close attention must be paid not only to the shape and size of the calyces and renal pelves but also to the ureters, especially in their distal part near their opening into the bladder The bladder must be examined from the point of view of the presence of a diverticulum and of residual urine (dye) after micturition

It follows from this that urinary stasis must be dealt with by such means as are available, and a free flow of urine is promoted by the intake of at least 3 litres of fluid daily

Infection

The commonest infection of the urinary tract is with *Bacillus coli* It is doubtful, however, whether a *B coli* infection is an important primary cause of calculus formation pure coli infections are less often complicated by lithiasis than would be expected if this type of infection had much to do with stone formation It is more likely that a coli infection is the result of stone formation, just as it is quite often a complication of tuberculosis and growths in the urinary tract An analysis of the core of urinary stones, if a micro-organism is present, generally reveals a

syndromes which have the clinical picture usually associated with gall blad disease, but in which the gall bladder itself appears to be quite normal, are inte gible These syndromes may be called, for want of a better phrase, hepato-bili dysfunction

There is considerable evidence that exogenous factors such as diet, obesity a a sedentary life play an important part in the genesis of gall bladder disea Particular support is given to this view by the mortality rates of the Registr General for England and Wales During the years 1938–45, covering a period

PREVENTION

A healthy life and dietary discretion seems to lessen the liability to these diseas

MANAGEMENT

The long term management of cholelithiasis and cholecystitis is a medic problem Surgical intervention is often necessary, but it should be regarded as a *incident only, albeit often a vital one, in the medical programme*

SURGICAL TREATMENT

Indications for surgical treatment will be discussed under headings of the variou syndromes In general it may be said that the results of cholecystectomy, which almost invariably the operation of choice, are good in the presence of stones an with advanced gall bladder disease, and much less good in their absence Befor surgery is undertaken there must be firm evidence that the gall bladder is diseased and every effort should be made to arrive at a precise diagnosis If this were alway done there would be fewer failures

d gall bladders suffer from othe

The

s wil

persist afterwards

The dangers of cholecystectomy have greatly lessened in recent years due to improvements in pre operative care, surgical technique, anaesthesia, and post operative management In this respect it has been aptly said that the anaesthetist is more important than the anaesthetic

Even so, it will often be difficult to decide whether or not a patient with a damaged gall bladder should have it removed The degree of symptoms the presence of other serious diseases, and age are all factors to be taken into account Old age is no bar to modern surgery, although it requires great pre-operative care *Yet it would* clearly be foolish to subject a patient who has had only minimal symptoms for many years to the risk of a major operation if his normal expectancy of life is short

Th of cancer developing in a diseased gall bladder is less than the risk of

all bladder

t careful assess

ment made

Bilateral renal calculi present the greatest difficulty in decision as to treatment. Winsbury-White (1935) points out that in these cases as a rule the renal tissue of both sides is impaired, and therefore conservative rather than radical measures

pyonephrosis, a permanent nephrostomy may be considered.

Solution "G" (Suby, 1944) which consists of citric acid (monohydrate) 32·25 grammes, magnesium oxide (anhydrous) 3 84 grammes, sodium carbonate (anhydrous) 4·37 grammes, water ad 1,000 millilitres, has been used for the dissolution of urinary calculi composed of calcium phosphate, calcium carbonate and

has no effect on calcium oxalate, uric acid or cystine stones.

PHOSPHATURIA

reaction and clears with boiling Phosphaturia is often found in neurasthenic and debilitated subjects The primary fault may be an increased gastric acidity It is perhaps most often seen as result of the alkaline treatment of stomach disorders, especially gastric ulcer

Treatment

Treatment is directed towards improving the patient's general condition; the prescription of dilute hydrochloric acid is hardly necessary simply on account of the

as a matter of fact, neither phosphaturia nor oxaluria of themselves seem to lead to stone formation

OXALURIA

Normal urine often contains envelope shaped oxalate, crystals The term oxaluria

cases were invariably fatal Now, with sulphonamides and penicillin, *many patients* can be saved, provided always that the obstruction is relieved as early as is practicable

penicillin should be given also Even when there is bacteraemia, lives may thus be saved if the obstruction to the common bile duct is surgically relieved (Chronic cholangitis is discussed in the section on the liver.)

ACUTE CHOLECYSTITIS, EMPYEMA, GANGRENE, AND FREE PERFORATION OF THE GALL-BLADDER

In acute cholecystitis the damage to the gall-bladder ranges from slight congestion of the mucous membrane to gangrene of the wall The contents of the viscus vary from mucus to pus In the large majority of cases there is a gall-stone impacted

acute cholecystitis and *vice versa* Moreover, coronary artery disease and gall bladder disorders frequently coexist in the same patient, and cardiac symptoms

tment is
ed non-
filling of the gall-bladder after a repeated dose of Pheniodol or perhaps after a double dose if the patient was very fat, again operative treatment is indicated. Stones are usually found in such cases If, however, there is the slighest doubt as to
the attack will subside,

ctomy is probably best
do
not immediately
av ad a chance to
subside, and to carry out a cholecystectomy after it is over *It is true that grave* complications such as emypema, gangrene, or the rare free perforation of the gall-bladder, which tend to affect patients in the older age-groups, can rarely be diagnosed when the patient is first seen, but, fortunately, they are uncommon

Every patient, however, should be put into hospital and a most meticulous
de or if there
ng leucocyte
ent of com-
plications, operation can still be done at once The dangers of operation are then greater, but the majority of attacks of acute cholecystitis settle down without serious trouble.

DISEASES OF THE GALL-BLADDER

CHOLELITHIASIS

Indications for surgical treatment

Indications for surgical treatment are (a) proved gall stones causing symptoms, especially biliary colic or jaundice, or the presence of complications such as pancreatitis, duodenal adhesions, biliary fistula and the like, obstruction to the cystic duct causing a mucocele of the gall bladder or acute cholecystitis, and

Conservative treatment

A large, single, silent stone with radiological evidence of good gall bladder function may safely be left, if the patient is kept under long term observation Similarly, silent stones in the aged should remain undisturbed In other patients the presence of serious concomitant diseases such as phthisis and severe cardiovas-

CHOLEDOCHOLITHIASIS

A stone lodged in the common bile duct must always be treated surgically The treatment of the accompanying biliary colic is described later

Notes on pre-operative and post-operative care

If a stone is lodged in the common bile duct operation is imperative Careful pre operative treatment should last at least one week In addition to measures already briefly referred to, patients will require injections of vitamin K, to lessen the chance of haemorrhage, Synkavit, which is water soluble and almost painless when injected, is a suitable commercial preparation The dose is 0 01 gramme intramuscularly once daily for 5 days before the operation If jaundice has been prolonged or if there is a suggestion of liver damage, one or more blood transfusions should be given

ACUTE CHOLANGITIS

Acute cholangitis is nearly always the result of a sudden obstruction of the com-

and bacteraemia Before the days of modern chemotherapy and antibiotics, such

MILK OF CALCIUM BILE

POST CHOLECYSTECTOMY SYNDROME (BILIARY DYSKINESIA)

The so-called post-cholecystectomy syndrome often means that the symptoms which were present before cholecystectomy persist after it This is too frequently the result of a careless selection of cases for cholecystectomy If only those gall bladders with stones or advanced disease are removed results are usually good

When symptoms arising after cholecystectomy are due to a residual stone in the common bile duct or to deformity of the duct (which may even include its involvement in a ligature or indeed its ligation and division) a second operation is neces

PRE OPERATIVE AND POST OPERATIVE TREATMENT

This is not the place to discuss pre operative and post-operative treatment in detail but *certain general principles may be stated*

PRE-OPERATIVE

If the patient is fat weight should be reduced if operation can reasonably be delayed (*see* page 952)

Accompanying diseases should so far as possible be controlled This applies

and

nce

on

the medical régime outlined above Adequate nourishment is very important, and apart from other considerations lessens the number of liver deaths which sometimes follow these operations The diet should be high in carbohydrate and pro-

If ... by mo th is impossible glucose and

uld be

started several days before the operation and continued for several days after it

In the presence of jaundice vitamin K should be administered (*see* above Choledocholithiasis page 947) *In addition to premedication ordered by* the anaesthetist to be given just before the operation patients will be helped by a small dose of phenobarbitone the night before and on the morning of the operation

POST-OPERATIVE

Nothing by mouth is given until *fluids can be kept down* On the other hand parenteral fluids must not be excessive (*see* page 537) When vomiting has stopped fluids are given by mouth Milk is badly tolerated On the third day solid food is begun and as soon as possible, the patient is put on to 3 meals a day consisting of a high protein low fat and moderate carbohydrate diet with vegetables and fruit and

page 537) Intravenous glucose is also required. Morphine, $\frac{1}{6}$ grain (0·01 gramme), and atropine, $\frac{1}{100}$ grain (0·6 milligram), may be given to relieve the pain and spasm, and may be repeated Dilaudid, $\frac{1}{32}$–$\frac{1}{16}$ grain (2–4 milligrams), is preferable to mor-

opened with simple enemas.

If operation is contemplated, vitamin K should be given by injection as described above in the treatment of acute choledocholithiasis As soon as the attack has subsided the patient should be put back on the medical gall-bladder régime.

CHRONIC CHOLECYSTITIS

Patients who have both clinical and radiological evidence of definite chronic organic gall-bladder disease should have the gall bladder removed Clinical

pictures were made Fat patients may require larger doses of dye than normal A well-filling but sluggishly emptying gall-bladder may be associated with digestive

be weighed carefully against the dangers of surgery and the expectancy of life A large number of patients can be kept comfortable on a medical régime (*see* below).

CHOLESTEROSIS

The "strawberry" gall-bladder presents a therapeutic problem The wisest course in most cases is to remove the gall-bladder if the patient has had attacks of biliary colic and if cholesterol crystals are found in the bile after duodenal drainage. In other words, operation is carried out if there is this indirect evidence of the *presence of calculi. With no such evidence the patient should be treated with a* medical régime (*see* below)

In brief it consists of attention to hygiene (proper rest and exercise), the prescription of choleretics, cholagogues and cholecystagogues as required, and advice as to a simple well balanced diet devoid of rich food and cooked fats In conjunction with this régime, symptoms and concomitant diseases are treated as necessary In many cases obesity and menopausal symptoms must be treated Arteriosclerotic heart disease is often present, maybe diabetes mellitus, and other disorders In the group called hepato-biliary dysfunction with a normally functioning gall bladder inquiry should be made for the aggravating factor, which is frequently psychological

Hygiene

Over-exertion and prolonged fatigue should be avoided Adequate rest is essential Patients should be encouraged to take regular moderate exercise in the fresh air but should avoid jolting such as may be caused by horse-riding Sitting crouched over a desk or a motor-car steering wheel for long periods is particularly harmful Light clothes should be worn

Diet

General principles —To set down a rigid diet for these disorders is impossible In each individual many features other than the biliary disturbance will have to be considered These may include obesity, dyspepsia, constipation irritable colon and so on, as well as concomitant diseases such as diabetes mellitus The diet will have to be arranged accordingly

[illegible] all balanced

exogenous cholesterol are disputed, but the value of a simple diet without rich foods is unquestioned The restriction of fat helps the digestion contributes to the cure of obesity, and is kind to the liver The theoretical advantages of a high fat diet in certain cases are completely outweighed by the discomfort it causes to these sedentary patients Although cooked fats are excluded, uncooked fat such as butter should be allowed, and the fat in the diet should not be less than 40 grammes a day

Patients should be asked what foods upset them, and these should be omitted from the diet

Obesity should be reduced (*see* page 950) The patient should take 3 meals a day and drink a minimum amount of fluids while eating There must be no eating between meals "Snacking" is one of the major causes of obesity

Foods allowed

Lean meat beef mutton veal lamb
[illegible]

Stale bread toast, cooked cereals, plain cake
Most green vegetables cabbage, lettuce, spinach and others
Runner beans
Starchy vegetables potatoes carrots peas and broad beans, beetroot and others
All fruits except raw apple
Sugar, jam, marmalade and honey
Vegetable soups

These simple measures greatly lessen the dangers of venous thrombosis and subsequent pulmonary embolism, pulmonary collapse, and pneumonia The patient should carry on with the medical régime for at least 6 months and usually longer

HEPATO BILIARY DYSFUNCTION

Although this article is concerned with treatment, reference must be made to a large number of patients who present symptoms typical of mild attacks of cholecystitis, but whose gall bladders are radiologically normal These patients are often mistakenly subjected to surgical treatment, and at operation in such a case the gall-bladder is not certainly diseased This syndrome occurs chiefly in women, and it is characterized by pain and tenderness under the right costal margin, localized to the region of the gall bladder The pain may be extremely severe There is often nausea, sometimes a little fever during the attack, and various other symptoms such as headache and diarrhoea The attacks may be precipitated by certain foods, especially by cooked fats, or by worry and other emotional reactions The following groups may be recognized There is one which includes highly strung individuals who are liable to bilious attacks or biliary migraine. Another group includes those who have lived for some years in the tropics, who appear free from tropical disease,

biliary dysfunction" is preferred to biliary dyskinesia" as a descriptive term for

many of these cases, explanation, understanding and insight may be aided by small and regular doses of phenobarbitone

Hepato-biliary dysfunction may be accompanied by migraine The two are often combined to form one syndrome, biliary migraine, and they must be closely related to the old time bilious attack.

Treatment is on the medical gall bladder régime The cholecystagogue action of magnesium sulphate is especially helpful In addition to this régime the migraine is treated on the lines suggested on page 308

MEDICAL TREATMENT

General Plan

Introduction

The general plan of the medical management of these various biliary affections, whether with demonstrable gall bladder disease or without, is basically the same

Antispasmodics

Atropine and the nitrites are useful drugs when there is painful spasm

For more extended use some of the proprietary antispasmodics are suitable For instance, Trasentin, one tablet thrice daily before meals, or Neuro-trasentin, [illegible] d in the same [illegible] 5 millilitres

For the treatment of acute biliary colic *see* below

Antibiotics and chemotherapy

Penicillin and the sulphonamides have no place in the treatment of uncompli [illegible]

follows acute obstruction of the common bile duct

Hexamine and salicylates both of which are excreted in bile, were largely used in the past as biliary antiseptics, and have now been abandoned

Dyspeptic symptoms

The dyspeptic symptoms which accompany gall bladder disease are often those of which the patient complains most They are treated symptomatically with acids or alkalis and with antispasmodics

Biliary colic

[illegible] for the relief of biliary [illegible] ost un [illegible] nation [illegible] n (0 6 [illegible] olecys [illegible] above can be given instead of atropine [illegible] given orally or intramuscularly at intervals of not less than 4 hours, may control the pain effectively

Jaundice

For the treatment of jaundice *see* page 964

CIRRHOSIS

INTRODUCTION

One hundred and thirty years ago Laennec used the word cirrhosis, derived from the Greek word Κιρρός meaning orange-tawny to describe the appearance of the liver now known as portal cirrhosis With the passage of time the meaning of the word has changed to signify fibrosis The modern definition of cirrhosis is a

Foods not allowed or greatly restricted

Cholagogues

The derivatives of bile which will usually be found most useful in practice are bile salts and sometimes dehydrocholic acid Sodium tauroglycocholate, a true cholagogue, which is a mixture of sodium taurocholate and sodium glycocholate can be given in capsules after meals The dose is 2–6 grains (0 12–0 4 gramme)

glycocholate, sodium taurocholate, extract of cascara, phenolphthalein, and oleoresin of capsicum The dose is 1 tablet 3 times a day after meals It is a useful preparation but more laxative than Felamine Very occasionally a powerful choleretic is required Dehydrocholic acid can then be used with caution Tablets of Dehydrocholin (*B D H*) may be used One or two tablets each containing 4 grains of dehydrocholic acid (0 25 gramme) are given 3 times a day for 2 weeks at a time

Magnesium sulphate is a cholecystagogue Four grammes are taken in half a glass of warm water immediately on waking in the morning, after which the patient lies on the right side for 10 minutes Frequently, a smaller dose is required, either

tablets in half a glass of warm water taken in the manner described for magnesium sulphate Here again, a lesser dose is often needed, even as little as half a tablet Magnesium sulphate by mouth has replaced non surgical biliary drainage in the treatment of gall bladder disease

Bile salts and their derivatives, particularly dehydrocholic acid and magnesium sulphate, should not be given when there is acute cholecystitis or obstruction of the common bile duct

Laxatives

Bile salts and their derivatives are excellent laxatives and if the régime suggested above has been adopted nothing more may be required

In general, saline laxatives are useful but should not be given for extended periods Carlsbad salt, the equivalent of which is Sal Carolinum Factitium (*B P C*), 4

be drunk during the day but not with meals Small doses of cascara may be added If anything further is needed simple enemas may be given

Rest

Adequate rest is essential If the patient has acute symptoms, such as haemorrhage or decompensation evidenced by ascites, he should be put to bed for the initial part of the treatment, but it is important that he is not kept in bed for long after improvement has been established

Diet

The diet should be high in protein, high in carbohydrate, moderate in fat, and high in vitamin content especially whole vitamin B complex A suitable diet contains protein, at least 150 grammes, carbohydrate, 400 grammes, and fat, 70 grammes It includes eggs, lean meat, liver, poultry, fish, milk, butter, Cheddar cheese, fruit, green vegetables, bread and cereals

It is difficult sometimes to get sufficient protein into the diet with ordinary foods and the following additions are helpful Soya flour is a good source of protein for those who do not dislike the taste It can be made up into a thick soup flavoured with tomato National household dried skim milk contains approximately 10 grammes of protein in each ounce of powder (30 grammes) Prosol Brand high protein food, made from milk proteins fortified by the addition of aneurine hydrochloride and nicotinic acid, contains 20 grammes of protein in each ounce of powder (30 grammes) and only 1 per cent of fat For variety, these milk foods can be mixed with water, flavoured with peppermint and served cold as a sweet or they can be made up as iced coffee They are more palatable taken cold than hot Extra protein may also be given as an enzymatic casein hydrolysate such as Casydrol, which is best taken dry and washed down with water Casinal is a useful

hydrate ration

Condiments, spices and of course all alcohol must be avoided There is often anorexia and the patient may have great difficulty in taking a full diet Individual likes and dislikes must be studied and success will depend largely on the skill and ingenuity of the caterer

Dietary supplements and added vitamins—Liver extracts by mouth especially proteolysed liver, are useful supplements to the diet Hepamino prepared from enzyme-digested whole liver, in doses of 30 grammes daily, is a useful preparation Each ounce (30 grammes) contains 15 grammes of protein derivatives containing all the essential amino-acids It is rich in vitamin B complex vitamins A and D have been added One ounce (30 grammes) can be given once or twice a day It goes well with soda water Hepovite is another preparation combined with malt Crude liver extracts may be given intramuscularly, 2 millilitres daily

Brewer s yeast is a valuable source of vitamin B One ounce (30 grammes) can [illegible] Aneurine

[illegible] daily

[illegible] n be

lesion characterized by damage or destruction of the parenchymal liver cells,

proliferation of fibrous tissue (*see* page 960)

PORTAL CIRRHOSIS

Definition

Prevention

The present trend of opinion, based on the results of animal experiments, is to regard portal cirrhosis in man as a result of faulty nutrition Modern treatment is based on this assumption and patients are given diets containing generous quantities of protein and carbohydrate Whether or not the theory is sound, the results are often very good Again, according to this theory, alcohol, which is generally conceded to be one of the factors causing portal cirrhosis, produces first a gastroenteritis which in its turn leads to faulty nutrition and cirrhosis The role of alcohol has been questioned but there is no doubt that in practice in Great Britain alcohol, especially spirits, is still a most important aetiological factor, particularly among patients whose diet is deficient

Diagnosis and Early Treatment

morning nausea This is the time for the patient to stop drinking alcohol for life There are great differences in the amount of alcohol various people can take with impunity, but the quantity any person suffering from cirrhosis can endure is very small indeed It is surprising how many patients after a straightforward explanation of these facts will stop the habit at once and completely, with the knowledge that at this very moment the road divides, one leading to fitness, the other to a long and dreary illness Patients should be encouraged to eat a good mixed diet, to lead a healthy life, and to take adequate rest Intercurrent infections should be carefully treated

Treatment of Late Stages

With vigorous treatment even the later stages of portal cirrhosis may respond to treatment and the patient's life made tolerable

If paracentesis is contemplated salt should not be severely restricted from the diet

Paracentesis abdominis

It may be desired to remove ascitic fluid whatever its cause from the peritoneal cavity, either a little for examination, or much for relief of symptoms If much fluid is removed, it must be drawn off slowly Apart from the dangers referred to above, it causes a drop in the venous and arterial pressures, which may lead to collapse of the patient especially if he is hypotensive

Fluid may be removed either by paracentesis in the midline of the abdomen or the

injected into the skin and down to the peritoneum A small nick is made with a scalpel,

through the side of the rubber tube until it emerges from the other end of the cannula the rubber tube hangs into a bottle below the bed The guard is fitted to the cannula and lastly the handle of the trocar is attached The apparatus is then ready for use When fluid is reached, the trocar is withdrawn and the rubber tube pushed further over the

Treatment of Hepatic Failure (Cholaemia)

Treatment of cholaemia must be prompt if there is to be any hope of saving the patient's life

Fluids amounting to not less than 3 litres in the first 24 hours should be given intravenously The standby is 10 per cent glucose The first 2 litres consist of 10

velopment

A blood

Frequent

us infusion and also

nide, 100 milligrams,

and riboflavine, 10 milligrams

Intramuscular crude liver extracts, say 3 millilitres, are given daily, and continuous oxygen is administered at the rate of 5 litres a minute

Accompanying infections are treated appropriately with antibiotics, sulphonamides should not be given Treatment is continued until the patient can once more eat by mouth

be added when the patient cannot eat a full diet.

The administration of insulin and glucose was once popular but has largely been abandoned

Androgens

Patients with cirrhosis of the liver become feminized and tend to have testicular atrophy. For this reason testosterone proprionate, 25–100 milligrams a week, has been tried sublingually. Subjective improvement has followed, which may have been due to other general treatment with rest and diet It is possible that androgens have a deleterious effect on the damaged liver and they should be used with caution.

TREATMENT OF HAEMORRHAGE

stomach and lower oesophagus into the azygos veins and thence to the superior vena cava are the most important. Indeed, it is surprising how seldom rectal haemorrhoids result from portal hypertension

A sudden brisk haemorrhage from oesophageal varices may be the first indication

TREATMENT OF ASCITES

The cause of ascites in portal cirrhosis is by no means simple. It seems to depend

intramuscularly every few days. Fluids need not be restricted. A more effective method of producing diuresis is by using a diet very low in sodium content with an excess of acid ash, such as described by Schemm (*see* page 924) These diets can be fortified with protein

They require the use of salt-free bread, porridge and butter and have the added disadvantage of being unappetizing.

If these means fail and the ascites is causing great discomfort, the fluid may be withdrawn Repeated withdrawals of fluid, though sometimes necessary, should be undertaken with caution They may cause a worsening in the general condition of the patient, and sometimes seem to hasten the onset of cholaemia.

ACUTE AND SUBACUTE NECROSIS OF THE LIVER

Very occasionally a patient with acute hepatitis may develop massive necrosis of the liver, either acute with coma and death within a few days or subacute which though less severe may also prove fatal More often, though still infrequently, infective hepatitis may merge into a state of subacute necrosis with jaundice which waxes and wanes or recurs in attacks for months or years and at any time may end in hepatic failure or, more rarely, recovery

Acute necrosis, which may also occur in the puerperium, or after certain noxious chemicals, or for no apparent cause, must be treated promptly on the lines outlined for cholaemia (*see* page 958) Plasma transfusions and infusions of glucose are *particularly useful*

Similarly, subacute necrosis, which may follow acute hepatitis or the giving of certain chemicals, is more often idiopathic As has already been said, accurate diagnosis is of the greatest importance A mistaken laparotomy may prove fatal Vitamin K does not raise the lowered prothrombin content of the blood in this condition and the danger of haemorrhage at operation is very great

Treatment is the same as for a severe case of acute hepatitis, remembering particularly the need for physical rest In the late stages of this disease the clinical picture may be indistinguishable from portal cirrhosis and should be treated as such (*see* page 955)

GROWTHS

GALL-BLADDER AND BILE-DUCT—NEW GROWTHS

Malignant growths in the region of the head of the pancreas include not only carcinoma of the head of the pancreas and of the ampulla of Vater, but also carcinoma of the hepatic ducts, the common bile-duct, cystic duct, and of the gall bladder itself Patients with such growths should be given the benefit of a laparotomy The results of operation for carcinoma of the gall bladder are bad because the liver is invaded early Carcinoma of the ampulla of Vater may be operable

PRIMARY TUMOURS AND CYSTS

BENIGN TUMOURS

Primary benign tumours of the liver are rare and the majority consist of angiomas When they are large enough to cause clinical signs, surgical removal may be feasible and the published results of such removal are encouraging

MALIGNANT TUMOURS

Primary carcinoma of the liver cells is uncommon in Great Britain Nearly always it arises in a cirrhotic liver It is more common among peoples who have a greater incidence of cirrhosis such as the natives of East Africa The treatment is usually symptomatic, although removal by partial hepatectomy has been done

Surgical Treatment

Oesophageal varices

Various attempts have been made to obliterate oesophageal varices with sclerosing fluids, and have proved disappointing The portal hypertension persists and new varices form

Portacaval shunt and spleno-renal anastomosis —These operations are still in the experimental stage, but offer new hope for those cases which have frequent and dangerous haemorrhages In the porto-caval shunt operation, the portal vein is anastamosed to the inferior vena cava In the operation of spleno-renal anastomosis the spleen and left kidney are removed and the splenic vein is anastomosed to the left renal vein These operations are indicated for patients who have frequent and dangerous haemorrhages due to portal hypertension They should only be contemplated when the patient has been restored to the best condition possible by medical treatment They should not be attempted if there is any evidence of active hepatitis because of the great risk to life involved

It may be mentioned here that the condition known as the Cruveilhier Baumgarten syndrome, with a patent umbilical vein, liver atrophy and little fibrosis of the liver is not suitable for surgical treatment

Ascites

Devices to drain ascitic fluid into the extraperitoneal tissues have long been practised The best known operation was the Talma Morison operation Various methods have also been tried to create a drainage between the peritoneal cavity and the subcutaneous tissues of the abdominal wall, such as the insertion of a hollow glass button into the lower rectus sheath These methods have generally been unsuccessful Nevertheless, the rationale is sound, and perhaps one day a successful technique may be perfected

[illegible]

PIGMENT CIRRHOSIS (HAEMOCHROMATOSIS)

Treatment is ineffective in arresting the progress of the [illegible]

BILIARY CIRRHOSIS

For practical purposes biliary cirrhosis is the result of obstruction to the outflow of bile through the extrahepatic biliary passages The only effective treatment is relief of the obstruction by operation

containing antigens which will transmit the disease to others If given to contact during the incubation period, up to *about 3 weeks after contact*, it will prevent or ameliorate the disease. It confers passive immunity for from 6 to 8 weeks From a practical point of view it is obvious that the use of *gamma* globulin for this purpose *is extremely limited* It has no value in the treatment of the disease

REMEDIAL TREATMENT

Rest in bed

All cases, young or old, mild or severe, should be put to bed at complete rest except for being allowed to use the lavatory They should be kept in bed until their

quiet physically-restful holiday for 2 or 3 weeks more The interval between the onset of symptoms and return to work is about 6 weeks in the average adult The older the patient the longer the jaundice tends to persist

Diet

At first patients will have a strong dislike for food and be unable to eat because of nausea and perhaps vomiting During these 2 or 3 days food should consist of sweetened drinks and anything else the patient can be persuaded to take *Only in* very severe cases is intravenous glucose, 10 per cent in distilled water, required

hasten convalescence Coaxing and encouragement are often necessary to persuade the patient to take it If desired, brewer's yeast, 30 grammes daily, in divided doses, may be added, but it has an unpleasant taste and should not be forced Methionine and choline do not appear to help Milk protein, such as Casinal, is a useful and palatable protein supplement

MEDICINAL TREATMENT

Drugs which are liver poisons or which tax liver resources are withheld, alcohol is prohibited, and morphine and barbiturates should not be prescribed Penicillin

(Epsom salts) is the best laxative For restlessness or insomnia the drugs recommended are aspirin, sodium bromide and chloral hydrate

AFTER-TREATMENT

Unless the patient feels completely fit after his holiday, he should lead a quiet

(up to 12 months), if the attack was severe or if there is a relapse Alcohol is

Primary carcinoma of the bile-duct cells is sometimes seen, and occasionally malignant angioma Other primary malignant growths are rare

CYSTS

Apart from hydatid cysts which have been described elsewhere, the only cysts relatively common are solitary cysts, and multiple cysts which are part of polycystic disease

Solitary cysts, if large, are sometimes amenable to surgical treatment. There is no treatment for polycystic disease

HEPATITIS, ACUTE

INFECTIVE HEPATITIS

This common disease, once called catarrhal jaundice, is almost certainly caused by a filtrable virus which damages the parenchymal cells of the liver Treatment is therefore directed towards supporting the damaged liver cells

EPIDEMIOLOGY

The disease is endemic in most countries At certain times, especially during wars, and in certain places, it becomes epidemic This was particularly noticable [illegible]

diseases the virus is present in the faeces, but in both the usual method of spread appears to be by ordinary human contact, which is often casual, and not by faecal contamination It is possible that the infection is conveyed by speech or by dirty feeding utensils or by both The fly has been suspected of being the carrier, especially because of its dirty habits, but none of these theories has been proved Other methods of spread, such as water, are improbable

PREVENTIVE TREATMENT

Every effort should, of course, be made during an epidemic to improve the [illegible]

Those exposed to infection are advised to abstain from alcohol altogether, because it predisposes to infection and aggravates the disease Control of an epidemic is difficult, whatever precautions are taken, because of the long incubation period, the early infectivity, and the lack of certain knowledge of the method of spread

The disease is infectious during the pre-icteric phase of symptoms and perhaps even before they appear The suspected case, therefore, should be isolated, in the [illegible]

features of Weil's disease include the longer duration of the fever and the presence of a polymorphonuclear leucocytosis Pathological diagnosis is made by testing the serum for specific agglutinins, or by *recovering the organism from guinea pigs* inoculated with the patient's blood

TREATMENT

General measures for the treatment of fever and of severe damage of the paren chymal cells of the liver (*see* page 960) are instituted

Reports concerning the value of *penicillin are conflicting, but they are suffi*ciently encouraging to recommend a trial with full dosage

OTHER FORMS OF ACUTE HEPATITIS

Acute hepatitis following certain poisons will not be separately discussed Treatment is the same as for acute hepatitis or necrosis as the case may be Yellow fever has been described elsewhere (*see* page 1311)

JAUNDICE

The treatment of jaundice is obviously the treatment of the disease which is causing it, but the fact of a patient being jaundiced is an indication in itself for certain therapeutic measures which are summarized here

PRURITUS

Jaundice is often accompanied by generalized pruritus, which may be intense and persistent Pruritus is a symptom of jaundice itself, whatever the cause, but is frequently most marked in cases of extrahepatic biliary obstruction It is difficult to control

Local applications of simple evaporating lotions such as vinegar and water, or dilute spirit, or calamine lotion, may help It is often recommended that 1 per cent phenol is added to the calamine lotion, but this is hardly suitable if the whole body has to be covered Hot sodium bicarbonate solution is sometimes useful

Drug treatment in the past has been largely ineffective, but the new antihista

tolerance should be first tested with the smaller doses Benadryl cream [illegible] irritation in some cases when applied locally The subcutaneous and intravenous *injection of these drugs is not advised*

HAEMORRHAGIC DIATHESIS

Patients with persistent *jaundice develop a haemorrhagic tendency* This appears to be related to a lowered prothrombin content of the blood, which is always found in such patients An essential factor in the production of prothrombin is the vitamin K group, 1 4 naphthoquinones Normally *synthesized in the gut from* green vegetables by the action of bacteria, the vitamin K group requires fats and bile for its absorption, and normal liver tissue for its action

Thus, in jaundice resulting from extrahepatic biliary obstruction *vitamin* K group is not properly absorbed from the intestine, which results in a lowered pro-

cause of infective hepatitis, but has a most deleterious effect on the damaged liver. One drink may be followed by bile in the urine during convalescence

COMPLICATIONS

A very small percentage, less than 1 in 1,000 cases, develop acute or subacute necrosis of the liver (*see* page 960)

Most patients recover completely Some do not feel well for several months A few have symptoms resembling the hepato-biliary syndrome described on page 951, and treatment is the same as for that syndrome A very small number may possibly develop cirrhosis later, but our knowledge of this is incomplete

HOMOLOGOUS SERUM JAUNDICE

It is not certain whether the virus of this disease is the same as that of infective hepatitis or one closely allied to it The incubation period is much longer, 90–100 days, but this might be the result of a different path of infection The disease occurs more often after giving pooled plasma than after whole blood The clinical picture is identical with that of infective hepatitis, though often more severe, and the treatment is the same

PREVENTIVE TREATMENT

It is important that patients who have had infective hepatitis should not act as blood donors By the same token all blood donors should be questioned closely for a history of infection and pools of plasma should not be prepared from large

SYRINGE-TRANSMITTED JAUNDICE

Jaundice may follow the injection of arsphenamine or other substances, parti-

claved, before use on any patient

WEIL'S DISEASE

Most cases of Weil's disease in Great Britain are caused by infection with *Leptospira icterohaemorrhagiae* This organism lives in rats is excreted in their urine, and is carried by water Man is infected through the skin by way of cuts or sodden surfaces, and some think even through the conjunctivae or the mouth The disease is not common and is largely confined to certain occupations In the British Isles it has been found mostly in fishworkers, coalminers and sewer men, in that order; only 160 men are regularly employed underground in London's main sewers Recently a few cases infected by *L. canicola* have been identified This organism is harboured by dogs and excreted in their urine

Weil's disease is frequently confused with infective hepatitis Distinguishing

Gaucher's disease—In Gaucher's disease treatment is palliative Deep x rays to the spleen may cause temporary improvement Splenectomy on the other hand especially if performed in childhood may give great symptomatic relief by removing a large abdominal tumour Anaemia is treated with iron and if necessary by blood transfusion X ray irradiation of the bones may be used to relieve the pain which sometimes arises from extensive marrow involvement

Niemann Pick disease—For this disease there is no specific treatment

Amyloid disease—The arrest of amyloid degeneration depends on the ability to control the underlying causative disease

Glycogen disease (von Gierke s disease)—No specific treatment is available for this disease Small frequent meals of good carbohydrate and protein content are recommended The diet is kept low in fat because of the high blood cholesterol and ketosis

PANCREAS DISEASES

CONGENITAL ABNORMALITIES

Congenital abnormalities of the pancreas are uncommon Ectopic foci of pancreatic tissue annular pancreas and congenital cysts are seldom seen The treatment of fibrocystic disease of the pancreas is described on page 969

ACUTE PANCREATITIS

INTRODUCTION

The lesion of acute pancreatitis is thought to result from the action of activated pancreatic juice upon the gland itself It varies in degree from a glassy swelling and oedema of the pancreas to necrosis haemorrhage and suppuration The cause is unknown Probably some degree of obstruction of the pancreatic ducts is contributory Gall stones are frequently present in the gall bladder A history of alcoholic indulgence is not infrequent

When the lesion has not progressed beyond glassy swelling and oedema the
s necrosis
nose The
orms may
simulate some other grave abdominal catastrophe such as acute intestinal obstruction occlusion of the mesenteric vessels or perforation of a peptic ulcer The most useful diagnostic laboratory tests are estimations of the serum amylase and of the urinary diastase both of which are raised during the acute attack

TREATMENT

Radical

When the d agnosis is
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thrombin content of the blood, and explains the well known tendency to haemorrhage in operations on patients with jaundice The blood prothrombin level can usually be brought up to normal and the tendency to haemorrhage at operation

than the oily preparations when injected Injections of 10 milligrams daily should be continued for 2 or 3 days after operation

On the other hand menaphthone is ineffective when the liver is diffusely and grossly damaged as in subacute necrosis of the liver, and the danger of severe haemorrhage at operation remains For this reason the differential diagnosis between extrahepatic biliary obstruction and subacute necrosis of the liver before embarking on a laparotomy is most important A mistake is serious If a patient with subacute necrosis of the liver has a laparotomy the result may be fatal

DIGESTIVE DISTURBANCES

There is little that can be done for the treatment of anorexia The following mixture is sometimes helpful

Powdered rhubarb	½–1 gr	0 03–0 06 g
Sodium bicarbonate	15 gr	1 0 g
Syrup of ginger	15 min	1 0 ml
Compound infusion of gentian, to	½ fl oz.	15 ml

SURGICAL TREATMENT

METABOLIC DISEASES

Under this title are included fatty liver, the lipoidoses, Gaucher s disease, Niemann-Pick disease and various forms of xanthomatosis, amyloid disease and glycogen disease

disease The attacks frequently lessen in number and severity as time goes on

TREATMENT OF THE ATTACK

This has already been described Morphine should be avoided if possible because of the danger of addiction A prompt injection of Trasentin (*see* above) at the onset of pain may abort the attack

TREATMENT BETWEEN ATTACKS

SURGICAL

There is nearly always associated disease of the biliary tract It is rational to deal with this surgically, though it seldom stops the recurrent attacks of pancreatitis

General

Obesity should be dealt with Associated gall bladder disease and also diabetes mellitus, which is rare, are treated appropriately

Diet

Small frequent feeds of a bland diet, low in fats but with adequate carbohydrates and proteins, are best Large meals of rich foods should be prohibited Alcohol should be prohibited absolutely

Medicinal

Pancreatic extracts and diastase taken regularly may lessen the tendency to attacks

Pancreatic extracts are destroyed by the acid in the stomach and must be given in capsules which are soluble only in the intestine Among suitable commercial preparations is Festan, which contains three pancreatic enzymes One tablet is swallowed whole immediately after food Panteric Compound Tablets (C C.T No 504) are excellent These enteric-coated tablets contain 4 grains (260 milligrams) of

tions of Taka Diastase Taka Diastase, Liquid, 8 millilitres containing [illegible] Taka Diastase, immediately after food, is suitable Dyspeptic symptoms are treated symptomatically, and various emotional maladjustments may also require attention

CHRONIC PANCREATITIS

The term chronic pancreatitis is used loosely to cover a variety of conditions varying from recurrent acute pancreatitis referred to above, to a pathological

rea

tion

however, improvement is steady, conservative treatment should be employed An associated lesion of the biliary tract can then be dealt with at a future date

For the milder forms of acute pancreatitis without complications the treatment should always be conservative

Conservative (severe forms)

General —The patient is admitted to hospital and kept under close medical observation The temperature and pulse rate are recorded hourly and frequent leucocyte counts are made Estimations of serum amylase and urinary diastase are made and also of the blood sugar which may be disturbed No food or fluid is given by mouth Continuous gastric suction drainage is started at once to prevent small bowel distension and to stop the vomiting (*see* Peritonitis, page 1020)

Analgesics —Repeated subcutaneous injections of morphine in adequate doses may be necessary, but they do not always control the pain Pethidine, 0 1 gramme intramuscularly 4-hourly may be given

Antispasmodics —Atropine sulphate, besides acting as an antispasmodic, tends to lessen the amount of pancreatic secretion It may be given subcutaneously in doses of $\frac{1}{150}$–$\frac{1}{100}$ grain (0 45–0 6 milligram) up to 3 times in 24 hours Trasentin is often more effective The contents of one ampoule, 1 7 millilitre, are injected intramuscularly once, twice or three times in 24 hours Trinitrin tablets (glyceryl trinitrate) $\frac{1}{130}$ grain (0 5 milligram) dissolved under the tongue, 2 or 3 times in 24 hours, have been recommended but are often ineffective

Fluid balance —The water and electrolyte balance must be maintained with parenteral fluids (*see* page 535) In estimating the amounts, allowance must be made for the additional loss from gastric drainage When giving intravenous glucose the blood sugar level should be known Plasma transfusions are often very valuable

Later treatment —When the acute symptoms have subsided treatment is relaxed

small meals consisting of food low in fat, are given at frequent intervals about every 2 or 3 hours A restricted fat intake should be continued for several months

Conservative (milder forms)

The principles of treatment of the milder forms of acute pancreatitis are the

be given orally in doses of 2 tablets, 3 times a day during the acute phase, gradually decreasing the dose as the symptoms subside

RECURRENT ACUTE PANCREATITIS (MILDER FORM)

DEFINITION

There is a group of cases characterized by repeated attacks of the milder form of acute pancreatitis with glassy swelling and oedema of the pancreas The syndrome

SPECIAL METHODS

In a very few high grade defectives it is possible to remove associated neurotic difficulties by the use of a rather superficial psychotherapy

Defectives who are also mentally disordered should be considered for treatment by the new methods which are being found helpful in mental patients

No body of opinion yet exists in the literature of mental deficiency, but electro-convulsive treatment and leucotomy are both being tried There is certainly evidence that the former has been useful in some cases and there are hopes that leucotomy may ease the problems of nursing the continuously restless, noisy and destructive idiot

NOEL H M BURKE

Annotation (1947) 'Antenatal paediatrics' *Brit Med J*, 2 182
Millman C G (1939) *J ment Sci*, 85 970
Discussion (1935) *Proc R Soc Med*, 28, 17

MENTAL DEFICIENCY IN CHILDREN

Though it is possible to recognize mental deficiency very early in some cases (for example mongolism may frequently be recognized at birth) this is not the general rule In other cases, quite rightly doctors are loath to pronounce a child who is backward as mentally deficient until no possibility of doubt remains Therefore it is not until the second or third year of life that many children are so labelled But even before that age the disposal of defective children is a serious problem in paediatric practice

As soon as the diagnosis is made the practitioner is faced with two questions. namely, what and when to tell the child s parents, and also, what arrangements to make for the child's future

INFORMING THE PARENTS

For parents, there are few things more overwhelming than to learn that they have a defective child, implying, as it does, the abandonment of cherished hopes, and leaving instead, a future that will necessarily make great demands on time and
very earthly
a repugnant
hing to dis
orders of the mind that should not be minimized and may be keenly felt The out look is made more bleak because no curative treatment can be offered and, as the majority of defectives are physically sound, a vista of irremediable gloom stretches indefinitely forward before the eyes of the afflicted parents

With intelligent people, the task of giving this view of their child for the first time is unenviable, and it is perhaps most kindly done by waiting until their own suspicions that the child is mentally abnormal have become tantamount to a certainty On the other hand, it is not right to leave the parents for too long in
prevent them from develop-
ise the practitioner, when he
lose their confidence if they

of the gland, which may have a similar aetiology Sometimes it is possible to remove the stones (which are opaque to x rays), but usually a portion of the pancreas needs to be resected

Inflammatory cysts are an occasional sequel to acute pancreatitis They are pseudocysts with no epithelial lining Surgical treatment, if undertaken at all, may mean a major operation, because drainage often fails and excision may be impossible

PANCREATIC CYSTS

Cysts when not congenital, inflammatory or traumatic, are usually retention cysts caused by obstruction *They may be very large Because of the lack of inflammation* they are often easy to excise Cystadenomas, often multilocular, are extremely rare They should be excised

CARCINOMA OF THE PANCREAS AND OF THE AMPULLA OF VATER

It is well known that a carcinoma of the body of the pancreas is frequently associated with intractable pain It is less well recognized that a carcinoma of the head of the pancreas may also be associated with pain and that sometimes there is no jaundice

Carcinoma of the ampulla of Vater which may develop from a benign papilloma in the same position may cause intermittent jaundice

Laparotomy should always be done on these patients if for no other reason than [illegible]

ADENOMAS OF THE ISLETS OF LANGERHANS

[illegible]

PANCREATIC INSUFFICIENCY

It remains to mention briefly the symptomatic treatment of pancreatic insufficiency, whatever its cause, which is sufficiently severe to disturb absorption of foodstuffs and to produce large, loose, foul fatty stools

Diet should be bland and low in fat It should have a high protein content [illegible] creatitis between attacks

E. R. CULLINAN

in practice, with the present-day shortage of space that has been commented upon, it would be very difficult to procure the admission of a high-grade defective to an institution. Matters relevant to the admission of a defective child can be referred to the officer of the county council responsible for mental deficiency or advice may be obtained from the National Association for Mental Health, 39, Queen Anne Street, London, W.1.

[illegible]

defective children are not very different from those of normal children and, if the best is to be made of their limited endowments, it is essential that they should have [illegible]

defective may become a useful member of the family, requiring a certain amount of [illegible]

but when the general level of intelligence is average or below average, less contrast will be felt except in matters educational.

Institutional Care

[illegible]

In a particular case, therefore, one must deliberate carefully before recommending [illegible] the circumstances of the parents are easy it is occasion- [illegible] hand, [illegible] re of [illegible] allow her to give proper attention to her other children Again, there is a strong case for institutional care if the child is very restless, spiteful or unmanageable, or if some serious physical defect, such as blindness or epilepsy, coexists But, as has already been said, it is important, whatever decision is taken, that the child be allowed as great a part of his infancy and early childhood with his mother as may be practicable, provided always that the strain on the mother and the family is not too great

MALCOLM MACGREGOR

defect, but one must remember that a lack of robustness in infancy is an unsafe foundation upon which to base prophecies of survival, and so it is wise to be certain that lethal disability really exists before this course is adopted

Sometimes, from a knowledge of the personalities of the parents, it may be deemed wise to inform one and not both, and to leave the decision when to tell the other to the parent already informed This conspiratorial policy is only helpful

indicate that the child will be considerably backward by contrast with normal children, the use of the words "mentally defective" and "feeble-minded", which

unwise to enter into a discussion of the future implications at this early stage, though perhaps it may be said that special educational methods are certain to be needed One should emphasize that, although intellectually handicapped, all backward children (except low-grade idiots) are capable of training and that the patience and devotion that will need to be bestowed upon the child are likely to be in some measure rewarded The parents must be made to face the situation clearly and to realize that there is nothing to be gained from any form of treatment, otherwise they may squander time and money in a fruitless quest for medical opinion more acceptable to them

PROBLEM OF DISPOSAL

The first matter to be decided is whether to send the child to a home for mental defectives or whether he can be looked after in his own home If institutional treatment is decided upon, the age at which the child should go there has to be determined Except in unusual circumstances (such as when the child is shown to be neglected or ill-treated) the consent of the parent or guardian is needed for the certification of a mentally deficient child under the Mental Health Acts. When this consent has been obtained, a statutory responsibility rests with the local authority to find suitable accommodation for the child. Unfortunately, in many parts of Great Britain, the accommodation for mental defectives at present falls sadly short of what is required and there may be a wait of some years between certification and removal from home

CERTIFICATION

Certification itself is procured by the signature of two medical practitioners, one of whom must be recognized by the local authority for this purpose, and who has

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it must be remembered that, apart from this low grade group, the human needs of defective children are not very different from those of normal children and if the best is to be made of their limited endowments, it is essential that they should have the security that springs from an early childhood spent with their parents Defective

Institutional Care

Defectives, like other children, learn by precept and example and the training for
... that obtained by

and sisters, because he will find less unhappiness ...
a home in which his companions conform more to his pattern, and at first easy successes should be planned for him

In a particular case, therefore, one must deliberate carefully before recommend
... of the parents are easy it is occasion
...r hand,
care of
...ot allow
her to give proper attention to her other children Again, there is a strong case for institutional care if the child is very restless, spiteful or unmanageable or if some serious physical defect, such as blindness or epilepsy, coexists But as has already been said, it is important whatever decision is taken that the child be allowed as great a part of his infancy and early childhood with his mother as may be practicable, provided always that the strain on the mother and the family is not too great

MALCOLM MACGREGOR

NUCLEAR PHYSICS

INTRODUCTION

The contribution of recent advances in nuclear physics to practical medical treatment has as yet been small It is limited mainly to the use of radiophosphorus in polycythaemia vera and to a lesser extent the chronic leukaemias, and of radioiodine in some cases of carcinoma of the thyroid and a small proportion of cases of primary thyrotoxicosis Even in these applications of radioactive isotopes, it is probably too early to make a reasonable assessment of their therapeutic value, especially because of the possibility of late deleterious effects

During the next few years, further practical developments are likely, including the use of radiocobalt as a substitute for radium and the application to radiotherapy of machines such as the betatron, synchrotron and linear accelerator to generate penetrating multi million volt x-radiation

However, from the long term point of view, the most important influence of the recent developments in nuclear physics on medical treatment will almost certainly be an indirect one, resulting from the widespread use of isotopes, both radioactive and non radioactive, as tracers, or indicators, for the more fundamental study of normal and pathological metabolic processes and in investigations in pharmacology and chemotherapy For clinical investigations the use of the stable non radioactive isotopic tracers has the advantage of complete safety and availability in a number of cases, including carbon and nitrogen, where there is no suitable or safe [illegible]

[illegible]

GENERAL PHYSICAL PRINCIPLES ISOTOPES AND TYPES OF RADIOACTIVITY

[illegible]

particles are unstable and tend to convert themselves spontaneously, and by chance as far as individual unstable nuclei are concerned, into other more stable nuclei, that is, they are radioactive. The rate at which the unstable nuclei of any kind transform themselves or "decay" is a characteristic property of the isotope, and is

usually expressed in terms of the 'half-life' ...
number of the nuclei decays to half
radioactive materials range from les

so on for several successive generations of nuclei until a completely stable one is finally reached There are 3 such series occurring in nature, including in all about 40 natural radioactive isotopes The radium series starts from one isotope of uranium, the actinium series from another isotope of uranium and the thorium series from thorium, the final product of each series is a stable isotope of lead Very weak

have radioactive isotopes

of the isotope P^{31} (its exact atomic mass being 30 9843 in terms of O^{16} = 16 as standard) The atomic number or nuclear charge of all phosphorus isotopes is 15, *the unit being the positive electric charge of the proton or hydrogen,* H^1, *nucleus* which is equal in magnitude, but opposite in sign, to the negative charge on the electron (The weight of the electron is very small, being 1/1838 that of the hydrogen atom H^1) In the atoms of all phosphorus isotopes, 15 electrons circulate in "orbits" around the small central nucleus According to present views the nuclei of all atomic species are made up of protons and neutrons, the latter being uncharged neutral particles of very nearly the same weight as the proton, the protons and neutrons are held together by strong, but incompletely understood forces Thus the ordinary phosphorus isotope P^{31} has a nucleus built up of 15 protons and 16 neutrons By
nucleus whicl
15 extranucle

ntaneously to a more
is usually referred to
a nucleus in a radio
active transformation Radiophosphorus, P^{32}, like the great majority of radioactive nuclei, transforms itself in this way by changing its electric charge, while its ... almost the same The daughter nucleus has a resulting positive
of 32 units so
nent, namely

beta particles
nation called
y with a con

NUCLEAR PHYSICS

INTRODUCTION

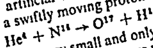
The contribution of recent advances in nuclear physics to practical medical treatment has as yet been small It is limited mainly to the use of radiophosphorus in polycythaemia vera and to a lesser extent the chronic leukaemias and of radioiodine in some cases of carcinoma of the thyroid and a small proportion of cases of primary thyrotoxicosis Even in these applications of radioactive isotopes, it is probably too early to make a reasonable assessment of their therapeutic value, especially because of the possibility of late deleterious effects

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In general, the remarkable war time technical applications of nuclear physics which led to the development of the chain reacting pile and the large scale produc-

GENERAL PHYSICAL PRINCIPLES ISOTOPES AND TYPES OF RADIOACTIVITY

example, by radium, polonium and plutonium In this type of radioactive transfor mation, which is limited almost entirely to the heaviest elements of atomic number 83 (bismuth) and higher, the nucleus emits an *alpha* particle, or He^4 nucleus of atomic number 2 and mass 4, and with a definite characteristic energy The high energy of the *alpha* particles emitted by radium C^1 was used by Rutherford in 1919 in the first demonstration of artificial radioactivity to convert a few nuclei of N^{14} into O^{17} with emission of a swiftly moving proton



$$He^4 + N^{14} \rightarrow O^{17} + H^1$$

The probability of disintegration is very small and only about one *alpha* particle in every million which passed through the nitrogen gave rise to a proton

There are two other types of radioactivity in which neither *beta* particles nc. *alpha* particles are emitted In the type called K-electron capture, the unstable nucleus reduces its charge, not by emitting a positive electron, but by absorbing one of its own orbital electrons, usually one of the so-called K-electrons from the innermost and nearest shell The vacancy in the electronic structure produced by the disappearance into the nucleus of the K-electron is filled by an electron falling in from an outer orbit and in the process characteristic x radiation is liberated In some cases, the nucleus after K-electron capture is left with excess energy which is radiated as *gamma* radiation, for example, the beryllium isotope, Be^7 Mention must be made of the other phenomenon called nuclear isomerism Some nucle retain excess energy for unusually long times, sometimes hours or days, fo example Br^{80}, of half-life 18 minutes, has a metastable state of half life 4 hours which undergoes an isomeric transition with release of the rather sm amount of excess energy as *gamma* radiation and internal conversion electrons sharply defined energy

PROPERTIES AND PRODUCTION OF ISOTOPES

Many tables of the properties of isotopes, both radioactive and stable available, such as those compiled by Mattauch (1941) and Seaborg and Per (1948), of especial interest, and including cross sections for slow neutron ca and absorption, is the chart of isotopes based on information furnish Drs Perlman, Seaborg and Segré in October 1947 and issued by the A Energy Research Establishment, Harwell Details of the nuclei forr fission, with decay characteristics, fission yields and chain relationship been published by the Plutonium Project (1946) The properties of isotopes of especial interest in medicine have been discussed by Lawre Hamilton (1948), Clarke (1948), and Mitchell (1947) Special menti be made of the invaluable book by Hevesy (1948) The general prin nuclear fission in relation to the chain reacting pile and the atomic bo been dealt with in numerous articles and books and are not directly rele of especial interest are the Smyth Report (1945), the British Informatic Report (1945), the Report to the United Nations Atomic Energy C (1946), and a more technical book edited by Goodman (1947)

two important general methods of artificial production of method uses highly energetic fast moving charged part , deuterons and *alpha* particles (that is nuclei of H^1, H of some suitable target element the ions are usual

property of the *beta* particles from the point of view of the therapeutic applications

value 0 70 M e v , which has been confirmed by microcalorimetric measurements of the small amount of heat produced in absorption of the *beta* particles

Radiophosphorus is a simple example and emits only *beta* particles but in the case of many isotopes, after a radioactive transformation the product nucleus still retains excess energy This may be radiated in the form of one or several quanta of electromagnetic radiation, the so-called *gamma* rays, which are usually much

and often not known with the certainty and accuracy necessary in therapeutic applications For example, the case of the widely used radio-iodine, I^{131}, of half-life 8 days, is very difficult The *beta* disintegration to radioxenon, Xe^{131}, is not simple, and at least 3 alternative schemes have been proposed to account for the

which appears to be a suitable artificial substitute for radium, of half-life 5·3

protection problems involved in the practical use of Co^{60}.

electrons) Many positron emitters are rather short-lived, for example C^{11}, of half-life 20 5 minutes and N^{13}, of half life 9 93 minutes, but there are a considerable number of longer lived positron emitters of interest such as Na^{22}, of half-life 3 0 years, Zn^{65}, of half-life 250 days, and As^{74}, of half-life 17 5 days.

Of great scientific importance is the well-known *alpha* decay shown, for

The generally accepted unit is the millicurie, abbreviated mc. One millicurie of a radioactive isotope is the amount in which, at the time of measurement, 37 million disintegrations occur per second The essential conception *is absolute measurement* of the number of disintegrating atoms per second It must be mentioned that while the value given is that almost universally used, it will probably need subsequent *revision to a slightly lower value such as* $3\ 6^{0} \times 10^{7}$ disintegrations per second

iodine, I^{131}, of half life 8 0 days, contains 8 03 × 10 [illegible] gramme of I [illegible] These very minute quantities are far too small to weigh and for their detection and measurement require very sensitive instruments such as the Geiger Muller counter, which is now available commercially

The Geiger Muller counter generally consists of a thin central wire with a sur [illegible] sitive [illegible] d by [illegible] me of the counter [illegible] at the [illegible] The small electrical impulses produced by each elementary particle are fed into an electronic system which with suitable "scaling circuits" drives mechanical recorders so that the number of particles can be counted in a given time The error of a given number of counts, n, is of the order of $\sqrt{n}$, regardless of the time of [illegible] speed

A new type of counter is being developed which depends on the production small flashes of light when fast electrons pass through crystals of naphthalene and some other chemicals These scintillations are recorded with the aid of photomultipliers *Existing instruments of th*[illegible] at least 10 times as sensitive as the Geiger Muller c[illegible] detecting [illegible] and further improvements are likely

While the Gei[illegible] *instrument for radio isotope* therapy, it is not [illegible] standardization Accurate determinations [illegible] ds in some cases and less accurate [illegible] a *b* [illegible] *made by means of a* standard [illegible] E, F [illegible] *alpha* ray count from F can [illegible] is [illegible] the "disintegration *measure-*

in a cyclotron The other method makes use of the neutrons mainly slow neutrons produced in the chain reacting pile On account of their lack of electric charge neutrons are especially effective in penetrating into atomic nuclei

The pile is without a rival in producing isotopes in the very large number of cases where a simple slow neutron capture process occurs for example $P^{31} + n \rightarrow$

parent atoms The question of the concentration of the induced radioactivity is very important In a pile there is a considerable escape of slow neutrons from the

result if elements are placed there for irradiation but unfortunately such materials have a serious effect on the pile by absorbing neutrons so that only small amounts can be irradiated in this way and at considerable expense There is therefore the

free material can be made by processes of neutron transmutation especially the n p reaction followed by chemical separation for example $S^{32} + n \rightarrow P^{32} + p$

There is one slow neutron (n p) reaction of especial importance $N^{14} + n \rightarrow C^{14} + p$ This reaction is the basis for the preparation of C^{14} the long lived radio carbon of half life about 5 700 years It is also of interest because it is probably responsible for at least half of the biological effects of slow neutrons the remainder of the effects being due almost entirely to the *gamma* radiation liberated as a result of the capture of neutrons by hydrogen nuclei

Although the radio iodine I^{131} used in therapy is a fission product it is usually prepared in a carrier free state by neutron irradiation in the pile of tellurium and chemical separation of the I^{131} produced by *beta* decay of Te^{131}

theless it must be remembered that many isotopes cannot be made in the pile for example Be^7 F^{18} Na^{22} V^{49} Mn^{52} Mn^{54} As^{74} and At^{211} or can only be made with extremely low specific activity The cyclotron can be used to prepare small amounts of *any* isotope and is still an essential supplement to the pile

STANDARDIZATION OF RADIOACTIVE ISOTOPES

less uniformly distributed throughout the body as in the case of radiosodium, Na^{24}

are practical examples of radioactive isotopes used in soluble inorganic form whose therapeutic action depends on selective concentration of the radioactivity in particular cells The usual therapeutic applications of P^{32} in the form of Na_2HPO_4 appear to be due to its synthesis into the nucleic acids of multiplying cells with greater rate of uptake into the abnormal cells of malignant type than into the normal ones, probably together with greater radiosensitivity of the abnormal cells The radiophosphorus is also concentrated in bone It is easy to understand the concentration of the radio-iodines by the thyroid in hyperthyroidism and in the rather rare cases of carcinoma of the thyroid in which the primary tumour and sometimes also the metastases retain the function of iodine concentration sufficiently to make it possible to deliver therapeutically useful doses of radiation by means of the selectively concentrated isotope Therapeutic trials, mainly at the experimental level and without much promise of practical value, have been carried

dangerous from the point of view of the risk of induction of malignant tumours of

inorganic form is capable of substantial extension Probably, the development of selectively concentrated organic compounds containing radioactive isotopes is a more promising line of approach

The use of a number of insoluble radioactive colloids has been reported in preliminary investigations of radioactive substances which either are taken up

these methods of ... anese
active colloids stu ... solu-
dioxide protected ... ibium
tion and the fissic

... reat promise in radiotherapy, is
... h as Li^6, B^{10} and U^{235} which release heavy ionizing particles of high energy when irradiated with slow neutrons

Radiophosphorus

Radiophosphorus was the first artificial radioactive isotope to be used in therapy Although first applied in 1936, it was not until 1939 that Lawrence Scott and Tuttle recommended its use in the treatment of chronic myeloid and lymphatic

RADIOACTIVE ISOTOPES IN TREATMENT

The use of radioactive isotopes in treatment is essentially a form of radiotherapy In general, it requires the experience of a radiotherapist and the collaboration of a physicist who is trained in radiotherapeutic dosimetry and has experience of the techniques of handling and measurement of radioactive isotopes The clinical problems include those met with in the use of external radiation Further, it is

bone marrow and reproductive organs and the less radiosensitive cells such as those of the kidneys which may be exposed during excretion At the present stage, dosimetry is to some extent empirical and correlation with the roentgen unit an incompletely solved problem, though nevertheless a useful and essential guide

frequent quantitative monitoring of the radiation hazards In addition to the specialized equipment, administrative arrangements must be made for the nursing of the patients and the safe disposal of excreta It appears to be essential to have side wards, sluice rooms and laboratory and storage space allocated for radioisotope therapy The avoidance of radioactive contamination is at least as important for accurate working as from the point of view of safety (Medical Research Council, 1949)

The present position with regard to the radiotherapeutic applications of artificial radioactive isotopes is summarized in Table I

TABLE I

THERAPEUTIC APPLICATIONS OF ARTIFICIAL RADIOACTIVE ISOTOPES

(1) Administered Internally	
(a) Selectively concentrated	
(i) Soluble inorganic	Practical P^{32}, I^{131} I^{130}
	Experimental Ca^{45}, Sr^{89}, As^{74}, As^{76}, 85^{211}
(ii) Colloidal inorganic	Experimental $CrP^{32}O_4$ $Mn^{52}O_2$ Au^{198}, Zn^{65}
For reticulo-endothelial diseases and injection implant '	
(iii) Organic	Experimental
(b) Uniformly distributed	Practical Na^{24}
(2) External *Gamma*-ray Sources	
	Practical Co^{60} Ta^{182}
	Experimental Unseparated fission products
	Zr^{95}-Cb^{95}, Ba^{140} La^{140}
	I^{131} Ir^{192}
(3) External *Beta*-ray Sources	
	Practical P^{32}
	Experimental Sr^{89} Y^{91} Ru^{106} Rh^{106}
	Ce^{144}-Pr^{144}, Dy^{165}, Ir^{194}

THERAPEUTIC POSSIBILITIES OF ARTIFICIAL RADIOACTIVE ISOTOPES ADMINISTERED INTERNALLY

After internal administration, artificial radioactive isotopes are either more or

patient should have further blood counts and be seen every fortnight for two months and then every month It is important to watch not only the red cell count and the haematocrit reading but also the total and differential white-cell count, especially the absolute lymphocyte count as in conventional radiotherapy It usually takes 3–6 weeks before a significant fall in red-cell count is observed, and about 3 months after a single dose of P^{32} for the red-cell count to settle down to a stable lower level This is because of the long life span of the human red blood cell for which the best recent value appears to be 127 days (Shemin and Rittenberg 1946) In cases in which the polycythaemia is uncontrolled, venesections should be continued to reduce the risks of thrombosis and haemorrhages during the latent period between the administration of the isotope and its effects on red cell formation

The second dose of radiophosphorus should never be given in less than 2 months after the first, and should usually be smaller than the first, for example 3–5 millicuries The best results and the longest remissions appear to have been obtained with two injections in the first course Once a satisfactory remission has been obtained the patient is seen for follow up examination, with full blood counts every 2–4 months. Recurrences of the polycythaemia are treated as in the initial course, but may need somewhat larger doses Remissions of 12–18 months are common and the longest remission observed appears to have been 5 years and 2 months

The advantages of radiophosphorus therapy in polycythaemia vera are the reliable production of remissions, the reduced incidence of thromboses and

ed, and
possible
rption

The deleterious effects on normal tissues must be considered, especially on the radiosensitive stem cells in the reproductive organs, bone marrow and lymphoid tissue and also, when the expectation of life is considerable as in polycythaemia vera, on the kidney The reality of these dangers has been demonstrated histologically by Platt (1947) in the organs of patients treated with radiophosphorus often with doses less than those generally used in the treatment of polycythaemia vera "Serious consideration must be given to the changes in the testes and the ovaries of patients who are in the reproductive period of life Observation of these organs confirms the possibility that spermatogenesis and oogenesis may decrease or disappear, with development of sterility in young persons given radio-phosphorus" The possibility of genetic injury must also be recognized Another possible risk from the use of radiophosphorus in the treatment of patients with a long expectation of life is late "carcinogenesis" meaning especially the possibility of induction of leukaemias and of osteogenic sarcoma after a latent period which may be estimated at 5 years as a rough practical minimum but may often be much longer It is as yet very difficult to assess this risk or even to decide whether it exists,

leukaemia It is now becoming possible to assess provisionally the therapeutic value of radiophosphorus when administered internally as inorganic phosphate. The only disease in which radiophosphorus has been found to give better results than x-ray therapy is polycythaemia vera and it is widely believed to be the treat-

The relevant physical properties and dosimetry of radiophosphorus are summarized in Table II

TABLE II

PHYSICAL PROPERTIES AND DOSIMETRY OF RADIOPHOSPHORUS

P^{32}

WITHOUT EXCRETION

1 microcurie destroyed per gramme gives a dose of 795 r
1 r is delivered by 1 26 μcδ per kilogram

WITH EXCRETION

(Approximate calculations assume effective half life 11 days)
1 microcurie destroyed per gramme gives a dose ~ 610 r
10 r is delivered by 1 15 millicuries destroyed in a patient weighing 70 kilograms, assuming uniform distribution

Differential Absorption Ratio
Approximate value for normal red bone marrow 1 5 and normal lymph node 2 5

N B—These calculations are based on the relation that 1 r of the usual filtered *gamma* radiation from radium, of mean energy 0 8 M e v, corresponds to the absorption of 93 1 ergs per gramme of water

It is often considered preferable to administer the radiophosphorus intravenously to avoid uncontrollable variations of intestinal absorption and to minimize wastage of the expensive isotope It has been administered intravenously in the form of

treatment of more than minimal amounts of milk and foods rich in phosphorus and medicines, such as iron compounds and alumina, which may precipitate phosphate Under these conditions it is safe to assume that 75 per cent of the dose administered orally will be absorbed

In the treatment of polycythaemia vera, different patients vary greatly in their response to the same dose and it is very important to think in terms of the whole

further clinical trials of radiophosphorus, perhaps with supplementary x ray [illegible]

radiophosphorus [illegible] id inferior to that produced by x-ray irradiation

Cancer—It is important to emphasize that radiophosphorus, used as at present in the form of inorganic phosphate, is of no therapeutic value in cancers generally

Radio-iodine

Although the short-lived radio-iodine, I^{130}, of half-life 12 6 hours, was used in the pioneer work, the most suitable isotope for therapeutic use in I^{131}, of half life 8 0 days Useful references include Hamilton and Lawrence (1942), Hertz and [illegible]

The relevant physical properties and dosimetry of I^{131} are summarized in Table III, as previously mentioned, there is still some uncertainty as to the physical data The examples assume uniform distribution of the radio-iodine, although, especially in carcinoma of the thyroid, radio-autography of sections usually shows gross departures from uniformity Hence to deliver an adequate minimum dose, the average dose of *beta* radiation from I^{131} is generally much larger than the dose of x-radiation required to produce a similar effect when delivered in a comparable over-all time For this reason, in addition to radio-resistance and low degree of fixation in the tumour, the total doses of I^{131} used in the treatment of selected cases of carcinoma of the thyroid are very large, often of the order of 100 millicuries and in some cases as high as 200 millicuries Proper equipment for safe handling and for the storage of urine, including recovery of the radio-iodine, are essential in dealing with the large amounts

TABLE III

PHYSICAL PROPERTIES AND DOSIMETRY OF THE 8 DAY RADIO-IODINE

I^{131} Half life 8 0 days β rays 600 K e v (85 per cent), 315 K e v (15 per cent)
γ rays 363 K e v (79 per cent), 638 K e v (15 per cent)
[illegible]

WITHOUT EXCRETION

1 microcurie destroyed ($\mu c\delta$) per gramme gives a dose of 127 r

WITH EXCRETION

Approximate calculations assume effective half life 6 32 days
1 $\mu c\delta$ per gramme gives a dose of approximately 100 r
Normal thyroid weighs 20 $\pm$ 5 grammes and contains 10-15 milligrams iodine

Examples [illegible] of I^{131} in the thyroid

163 cases treated before the use of radiophosphorus, Tinney, Hall and Giffin (1943) observed no instance of acute leukaemia, although in 10 per cent of the cases the terminal blood picture was indistinguishable from that of chronic myeloid leukaemia On the other hand, Lawrence (1948) after 12 years' experience of radiophosphorus had not observed any similar cases or any other evidence of carcinogenesis

From the evidence available, it must be concluded that it is usually unwise to employ radiophosphorus *in the treatment of patients of either sex in the reproduc-*

forthcoming. Further, *it is the author's opinion that in the present state of know*ledge, radioactive isotopes should in no circumstances be given by internal administration in the treatment of children.

The results of radiophosphorus therapy in diseases other than polycythaemia vera are much less satisfactory

The leukaemias—In chronic myeloid leukaemia and chronic lymphatic leuk-

the use of radiophosphorus as less safe In the chronic leukaemias, and in most of the other diseases treated, except polycythaemia vera, the "fractional method" of dosage of P^{32} outlined by Low-Beer, Lawrence and Stone (1942) is generally used. The initial dose is usually 2 millicuries, followed by doses of 1 millicurie twice

treatment and may be useful near the end of the original course of treatment. In chronic myeloid leukaemia, the radiophosphorus is often continued until the total white cell count has fallen to 30,000 per cubic millimetre, but every case must be considered individually

A satisfactory palliative response was reported by Hall (1948) in one case of

case of generalized myelomatosis with leukaemic changes (? plasma-cell leukaemia) (Hall, 1948)

same degree that it does in the case of normalt hyroid tissue (Rawson and his colleagues, 1949)

It is important to note that the large doses of I^{131} used, of the order of 50 milli curies per unit dose, have apparently produced no deleterious effects on the kidneys or the haemopoietic system, *gamma* ray doses of the order of 100 r could be delivered in such cases at the ovary from the radio-iodine excreted in the urine and accumu lated in the bladder, but it seems unlikely that this factor would be a contra-indication to treatment These findings confirm the safety of the treatment of hyperthyroidism but provide no evidence on possible long term deleterious effects

ARTIFICIAL γ-RAY SOURCES IN RADIOTHERAPY

The possibility of production, in the pile, of artificial *gamma* ray sources for use in radiotherapy has been discussed in a number of reports and papers (Dunworth and Mitchell, 1945, Mayneord, 1946, Mitchell, 1946 and 1947, Mayneord and Cipriani, 1947, Myers 1948)

The most promising substitute for radium in radiotherapy appears to be radio cobalt, Co^{60}, of half life 5 3 years The second choice is probably radiotantalum Ta^{182}, of half life 117 days

The *gamma* radiation from radiocobalt, Co^{60}, appears to be eminently suitable for radiotherapeutic application and the associated *beta* radiation is relatively soft

trials of radiocobalt used in the form of irradiated cobalt wire enclosed in stainless steel needles for implantation A specific activity of 36 millicuries per gramme in the form of cobalt wire of diameter ½ millimetre gives a linear strength of 0 629 millicuries of Co^{60} per centimetre, which when enclosed in a stainless steel jacket of ⅛ millimetre thickness corresponds almost exactly in *gamma* ray activity to 1 milligram per centimetre of radium filtered by ½ millimetre platinum Radiocobalt can

therapy equipment One of the practical difficulties to be overcome in the use of radiocobalt is the provision of arrangements for reactivation in the pile

ARTIFICIAL β RAY SOURCES IN RADIOTHERAPY

The need for accurate dosimetry with *beta* ray applicators cannot be over emphasized The practical limitations of the usual radium *beta* ray plaque are such

agent in the treatment of very superficial skin lesions, including basal-cell carcinoma

Na_2HPO_4 solutions containing measured activities of P^{32} and dried were made as required with an adequate margin for the lesion and fixed with adhesive tape This

It is important in calculating the approximate dose to assess the volume of [illegible] and for the purpose Plast[illegible] and thin-walled [illegible] approximate proportion of the administered radio-iodine which will be fixed in [illegible] percentage of a single tracer dose [illegible]

Oral administration is almost invariably used The solution given to the patient [illegible]

which the symptoms have recurred or persisted after surgery, or in which surgery is contra-indicated, except in the adolescent and young cases, when the use of external x ray irradiation is still probably of value Contra-indications to the use of radio-iodine include secondary thyrotoxicosis, toxic nodular goitre, non toxic goitre, autonomic imbalance without convincing thyrotoxicosis, and, of course, pregnancy. There is no evidence of renal damage Myxoedema is a possible complication Histological studies show that the widespread fibrosis produced in the thyroid by radio-iodine treatment may sometimes be accompanied by engulfed hyperplastic follicles with associated residual hyperthyroidism

Only a small proportion of all cancers of the thyroid retain the function of iodine concentration sufficiently to deliver therapeutically useful doses of radiation by means of radio iodine There are rare and widely discussed cases in which functional [illegible]

tion and the same end can be accomplished by radio-elimination (of the thyroid tissue) An interesting possibility is raised by the finding that thiouracil does not inhibit the collection of iodine by functioning cancers of the thyroid to the

linear accelerators is in the region of 3 5–5 M e.v

Probably the highest energy required for clinical therapeutic trials of the x radiation will be proved by an instrument working up to 30 M e v. It has yet to be determined what are the optimal voltages required for radiotherapy of lesions in different sites (Mitchell, 1946)

Kerst and his collaborators (Skaggs, Almy, Kerst and Lanz, 1946) succeeded in extracting the electron beam from the betatron but the therapeutic possibilities of high energy electrons are as yet unexplored and rather uncertain, though of great interest (Uhlmann and Skaggs, 1949, Glocker, 1949)

J S MITCHELL

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type of surface applicator should be capable of great improvement, perhaps by incorporation of P^{32} into plastics. The author's calculations for the dose rate at the

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THERAPEUTIC POSSIBILITIES OF FAST NEUTRONS

Nevertheless, much further radiobiological investigation of fast neutrons is

If the conclusion is correct that fast neutrons are not as good a therapeutic agent as x-rays and *gamma* rays, it seems likely that the same will hold true for fast protons (Wilson, 1946) and fast deuterons (Lawrence, 1948)

It must be mentioned that the pile cannot compete with the cyclotron as a source of fast neutrons for practical radiotherapy, mainly because of the essential difficulty that the energies of the neutrons produced in the pile are not sufficiently high

THERAPEUTIC APPLICATIONS OF HIGH ENERGY X-RAYS AND FAST ELECTRONS

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recent development is the linear electron

Fast neutrons

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Radiocobalt

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about 15 per cent of the total calories In addition, of course, many vegetables and fruits contain a considerable amount of carbohydrate Certain countries in the tropics or in the Far East which have a low level of nutrition may obtain over 75 per cent of their calories from carbohydrates A practical problem when dealing with individual patients is that many diets contain too much carbohydrate in *relation to the amount of fat and protein*

FATS

relatively low caloric value, to furnish the required number of calories One tends to eat what appears to be a very large meal, yet the meal is no sooner finished than one experiences, in spite of a distended abdomen, a feeling of emptiness and a desire for more food Furthermore, as fat leaves the stomach much more slowly than carbohydrate, a number of calories in the form of fat prevents the develop-

acid and arachidonic acid—not only supply energy but are essential for normal metabolism Fortunately these fatty acids are so widely distributed in the commonly used fats and are required in such small amounts that as long as the diet supplies some fats there is no danger of a shortage

Fats are obtained either from animal sources, such as the fat of meat, lard, butter, cream and milk, or from plant sources, such as cooking fats made from vegetable oils and margarine (in which cottonseed, soya bean, pea-nut and palm oils, and sometimes whale oil, are used), and nuts Calories derived from fats are more costly than calories derived from carbohydrates

PROTEINS

The individual ere are 22 *in all*, They are

arginine	methionine	histidine	phenylalanine
*iso*leucine	threonine	leucine	tryptophane
lysine	valine		

animal form when it is available The commonly used animal proteins are meat, fish, poultry, eggs, milk and cheese Although the animal proteins are nutritionally the more valuable, it should be remembered that a suitable mixture of plant proteins

NUTRITION

INTRODUCTION

it is known that there are no less than 40 nutrients essential for life, and today a considerable portion of the activities of biochemists and physiologists is devoted to the study of the absorption and metabolism of these nutrients Physicians are pay-

NUTRIENTS ESSENTIAL FOR LIFE

Before the effect of good and poor nutrition is considered from the clinical standpoint, knowledge of the nutrients essential for life will be briefly reviewed They may be divided into 5 main groups carbohydrates, fats, proteins, minerals and vitamins

CALORIES

of tissue are satisfied, proteins are used as a source of energy

The caloric requirements of the human, which vary according to age, sex and activity, are known with a considerable degree of accuracy It is now well recognized that when food intake falls below a certain level the ability of the individual to do both physical and mental work is reduced During World War II this fact was used as a weapon of war in many occupied countries where the food intake was set at a level which, while sufficient to keep the population alive, lowered their initiative so that they caused comparatively little trouble

The figures of the total volume of food that disappears in the retail channels are available for many countries On the *per capita* basis, the amount of food that dis appeared into retail channels per day in the year 1943–44 in the United Kingdom was 2,854 calories, in Canada, 3,223 calories, and in the United States of America, 3,271 calories It is estimated that these figures are reduced by 150–300 calories *per caput* per day due to loss between the retail trade and the actual consumption of the food It must be realized of course that this available food is not taken equally by everyone

CARBOHYDRATES

One gramme of carbohydrate supplies approximately 4 calories. As stated, carbohydrates are used as a source of energy They are the cheapest and most readily available of the food groups Cereal grains in Canada supply approximately 25 per cent of the total calories consumed, and in ordinary times sugar supplies

were essential for life. We now know that these "unknown substances" are the

two the names Fat soluble A and Water soluble B were suggested, thus initiating the alphabetical nomenclature of the vitamins It was subsequently discovered that there are more than two vitamins Chemists also found that the vitamins are definite chemical substances and have been able not only to determine their exact formulae but also, in many instances, to synthesize them.

The 16 vitamins which have been isolated to date and their place in animal nutrition demonstrated are

- vitamin A
- vitamin B group, consisting of
    - thiamine (aneurine)
    - riboflavine
    - niacin (nicotinic acid)
    - *pantothenic acid*
    - pyridoxin
    - inositol
    - biotin
    - *para* aminobenzoic acid
    - choline
    - folic acid
- *vitamin C, or ascorbic acid*
- vitamin D
- vitamin E
- vitamin K
- vitamin P

As yet all these vitamins have not been demonstrated as essential for man The ... vitamin A, thiamine, riboflavine, niacin, ... D Vitamin D also can be manu... violet rays on 7-dehydrocholesterol. Vitamin K can be synthesized by *intestinal bacteria, and there is some evidence* that this may also occur with some of the other vitamins

Interrelationship of the different Nutrients

Although carbohydrates and fats are both sources of calories, they are not completely interchangeable and the body requires both groups of nutrients An imbalance of the amino acids can produce profound disturbances Evidence of a *relationship between amino acids* and vitamins is the fact that the amino acid, tryptophane, may function as a precursor of the vitamin, niacin, also, the recently recognized member of the vitamin B complex, folic acid, has as an essential component, glutamic acid, one of the amino acids The relationship between the vitamins and minerals is exemplified by the well known action of vitamin D in *promoting the optimal utilization of calcium and phosphorus*

tein requirements are increased

Animal proteins are the most expensive group of foods In contrast, cereals are the cheapest If people have money, they will usually, but not always buy enough protein

MINERALS

Thirteen minerals are essential for the normal metabolism of animals These are

calcium	iodine	phosphorus	magnesium
sodium	manganese	chlorine	sulphur
iron	cobalt	copper	zinc
potassium			

The story of the discovery of the importance of some of those minerals that are

cobalt was furnished to these animals they promptly recovered

It may be assumed that these 13 minerals are also necessary for man. Fortunately however with any varied diet most of them are obtained in adequate

VITAMINS

These are substances which are required in relatively minute amounts and are essential for the normal metabolism of the body The absence of any one of the essential vitamins over a period of months will result in death

In 1881 Lunin reported that animals fed with purified fats, carbohydrates proteins and minerals died and concluded that small quantities of unknown substances

that we can estimate the requirement of these factors within 500 calories, but they are added merely for simplicity of calculation In the present revision, riboflavine allowances are based on body-weight rather than caloric levels Other members of the B complex also are required, though no values can be given *Foods* supplying adequate thiamine, riboflavine, and niacin will tend to supply sufficient of the remaining B vitamins

(*e*) There is evidence that the male adult needs relatively little iron The need will usually be provided for if the diet is satisfactory in other respects

(*f*) The need for supplemental vitamin D by vigorous adults leading a normal life seems to be minimum. For persons working at night and for nuns and others whose habits shield them from the sunlight, as well as for elderly persons, the ingestion of small amounts of vitamin D is desirable

(*g*) During the latter part of pregnancy the calorie allowance should increase to approximately 20 per cent above the preceding level. The value of 2,400 calories represents the allowance for pregnant, sedentary women

(*h*) Allowances for children are based on the needs for the middle year in each group (as 2, 5, 8, etc) and are for moderate activity and for average weight at the middle year of the age group.

(*i*) Needs for infants increase from month to month with size and activity. The amounts given are for approximately 6–8 months The dietary requirements for some of the nutrients such as protein and calcium are less if derived largely from human milk

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formation concerning the human require-
t be based at present more on food habits
its While a requirement for certain un-
and arachidonic acids of natural fats) has
perimental animals, the human needs for
spite of the paucity of information on this
which make it desirable (1) that *fat be in-*
at least 20–25 per cent of the total calories
essential unsaturated fatty acids to the ex-
tal calories At higher levels of energy ex-
person consuming 4,500 calories and for
s, it is desirable that 30–35 per cent of the
at Since foodstuffs such as meat, milk,
o the diet, it is necessary to use separated
-margarine, lard, or shortenings to supply
ounts indicated

f *water for adults is 2 5 litres* daily in most
or diverse persons is one millilitre for each
ity is contained in prepared foods. At work
ay reach 5–13 litres daily Water should be
s of thirst usually serve as adequate guides
ick persons

or water are closely interrelated A liberal
the adult is 5 grammes daily, except for
y The average normal intake of salt is 10–
ich meets the salt requirements for a water
veating is excessive, one additional gramme
ich litre of water in excess of 4 litres daily
es 20–30 grammes daily may be consumed
Even then, most persons do not need more salt than usually occurs in prepared foods It has been shown that after acclimatization persons produce sweat that contains only about 0 5 gramme to the litre in contrast with a content of 2–3 grammes for sweat of the unacclimatized person Consequently after acclimatization, need for increase of salt beyond that of ordinary food disappears

Iodine —The requirement for iodine is small, probably about 0 002–0 004 mg. daily for each kilogram of body-weight, or a total of 0·15–0 30 mg daily *for the adult.* This need is met by the regular use of iodized salt, its use is especially important in adolescence and pregnancy.

Phosphorus —Available evidence indicates that the phosphorus allowances should be at least equal to those for calcium in the diets of children and of women during the latter part of pregnancy and during lactation In the case of other adults the phosphorus allowances should be approximately 1 5 times those for calcium In general it is safe to assume that if the calcium and protein needs are met through common foods, the phosphorus requirement also will be covered, because the common foods richest in calcium and protein are also the best sources of phosphorus

Copper —The requirement for copper for adults is about 1–2 mg daily; Infants and children require approximately 0 05 mg for each kilogram of body-weight The requirement for copper is approximately one-tenth that for iron A good diet normally will supply sufficient copper.

Vitamin K.—The requirement for vitamin K usually is satisfied by any good diet except for the infant *in utero* and for the first few days after birth. Supplemental vitamin K is recommended during the last month of pregnancy. When it has not been given in this manner, it is recommended for the mother preceding delivery or for the baby immediately after birth

Folic acid —Evidence for recognizing *folic acid (pteroylglutamic acid,* vitamin B_c, L. casei factor or vitamin *M)* as an essential human nutrient is presented by the Food and Nutrition Board of the National Research Council. The quantitative requirement cannot be closely estimated from evidence now available

[*By courtesy, National Research Council, Reprint and Circular Series, No* 129]

TABLE

RECOMMENDED DAILY DIETARY ALLOWANCES (*a*)

REVISED 1948

	Calories (*b*)	Protein	Calcium	Iron	V tam n A (*c*)	Th a mine (*d*)	R bofla v ne (*d*)	N acin (N cotin c acid) (*d*)	Ascorbic acid	V tamin D
		g	g	mg.	i u.	mg	mg	mg	mg	i.u.
Man (154 lb , 70 kg)										
Sedentary	2 400	70	1 0	12 (*e*)	5,000	1 2	1 8	12	75	(*f*)
Physically active	3 000	70	1 0	12 (*e*)	5 000	1 5	1 8	15	75	(*f*)
With heavy work	4 500	70	1 0	12 (*e*)	5 000	1 8	1 8	18	75	(*f*)
Woman (123 lb , 56 kg)										
Sedentary	2 000	60	1 0	12	5 000	1 0	1 5	10	70	(*f*)
Moderately active	2 400	60	1 0	12	5 000	1 2	1 5	12	70	(*f*)
Very active	3 000	60	1 0	12	5 000	1 5	1 5	15	70	(*f*)
Pregnancy (latter half)	2 400 (*g*)	85	1 5	15	6 000	1 5	2 5	15	100	400
Lactation	3 000	100	2 0	15	8 000	1 5	3 0	15	150	400
Children up to 12 yrs (*h*)										
Under 1 yr (*i*)	110 2 2 lb (1 kg)	3 5/2 2 lb (1 kg)	1 0	6	1,500	0 4	0 6	4	30	400
1 3 yrs (27 lb , 12 kg)	1,200	40	1 0	7	2 000	0 6	0 9	6	35	400
4–6 yrs. (42 lb , 19 kg)	1 600	50	1 0	8	2 500	0 8	1 2	8	50	400
7–9 yrs (58 lb , 26 kg)	2,000	60	1 0	10	3,500	1 0	1 5	10	60	400
10–12 yrs (78 lb , 35 kg)	2,500	70	1 2	12	4 500	1 2	1 8	12	75	400
Children over 12 yrs (*i*)										
Girls, 13–15 yrs (108 lb , 49 kg)	2 600	80	1 3	15	5 000	1 3	2 0	13	80	400
16–20 yrs (122 lb , 55 kg)	2 400	75	1 0	15	5 000	1 2	1 8	12	80	400
Boys, 13–15 yrs (108 lb , 49 kg)	3,200	85	1 4	15	5 000	1 5	2 0	15	90	400
16–20 yrs (141 lb , 64 kg)	3 800	100	1 4	15	6 000	1 7	2 5	17	100	400

(*a*) Objectives toward which to aim in planning practical dietaries The recommended allowances can be attained with a good variety of common foods which will also provide other minerals and vitamins for which requirements are less well known

(*b*) Calorie allowances must be adjusted up or down to meet specific needs The calorie values in the table are therefore not applicable to all individuals but rather represent group averages The proper calorie allowance is that which over an extended period will maintain body weight or rate of growth at the level most conducive to well being

(*c*) The allowance depends on the relative amounts of vitamin A and carotene The allowances of the table are based on the premise that approximately two-thirds of the vitamin A value of the average diet in the Uni ed States of America is contributed by carotene and that carotene has half or less than half the value of vitamin A

(*d*) For adults (except pregnant and lactating women) receiving diets supplying 2 000 calories or less, such as reducing diets, the allowances of thiamine and niacin may be 1 mg and 10 mg respectively The fact that figures are given for different calorie levels for thiamine and niacin does not imply

niacin, riboflavine and folic acid The earliest lesion is an hypertrophy of the fungi-

papillae [illegible]
of the ton [illegible]
as the at [illegible]
formation of furrows between large areas of atrophied papillae The furrows, which at first may be quite deep, become shallower, and eventually disappear as the condition progresses In the advanced stage, the tongue is thin with apparently complete atrophy of the papillae, giving it a smooth or "bald" appearance

Changes can also occur in the colour of the tongue In acute pellagra and sprue the tongue is scarlet With the above mentioned changes, particularly when due to a chronic deficiency of niacin, the tongue is red, similar to the colour of raw beef-steak A magenta or purple colour of the tongue sometimes responds to riboflavine therapy.

Gums

Gingivitis

Normal gingival tissue is light pink in colour The interdental papillae fill the interdental spaces and, along with the remainder of the marginal gum tissue, are in firm contact with, but not attached to, the teeth The free margin of the gum may be up to 2 millimetres in depth but the remaining gingival tissue is firmly attached to the tooth and bone The first sign of gingival inflammation is usually seen in the marginal gum tissue, most frequently in the interdental papillae, due to swelling, the involved gum tissue usually has a shiny appearance Over a period of many months, as the condition progresses, the swelling and redness become more marked and extend over the labial and buccal gingival areas Examination with a probe will show when the deeper gum tissue, which is ordinarily firmly attached to the teeth, has become detached, allowing a probe to be inserted to a depth of several millimetres between the gum tissue and the surface of the tooth Extensive detachment of gum tissue and destruction of the bony support of the tissues occur, with the eventual loss of the affected teeth

In the progression of the chronic changes, the gums become thickened, pale, and develop a hard leathery consistency The impression is given of an increase in fibrous tissue Unless the acute changes are superimposed, which often occurs, the gum tissue in the chronic form, although thickened, does not present a shiny surface

Many factors are involved in the production of these changes Local factors, such as malocclusion, can increase the stress on certain areas of gum and tooth- [illegible]

cause is excess tartar formation [illegible]

During recent years, so many discoveries have been made of the part played by the vitamins in the metabolism of the body that there has been a tendency to neglect the other nutrients It is obvious that in planning an adequate diet the supply of all the nutrients must be considered

RECOMMENDED DAILY DIETARY ALLOWANCES

The recommended daily dietary allowances of the Food and Nutrition Board of the National Research Council, Washington, D C, are set out in the Table on pages 997–998

DEFICIENCY DISEASES

Deficiency diseases are the result of an almost complete deficiency of one or more nutrients over a period of many months They are in most cases distinct clinical

result from a lack of certain of the vitamins A complete lack of vitamin A can result in the disease xerophthalmia, similarly, beri beri is the result of a lack of thiamine, pellagra of a lack of niacin scurvy, of a lack of vitamin C, and rickets, of a lack of vitamin D Today these diseases with the exception of scurvy and rickets, are a rarity in Great Britain, the United States of America and Canada In certain areas even rickets and scurvy are rarely seen At the Toronto Hospital for Sick Children, which serves a population of over one million people, 154 cases of severe rickets were admitted in 1925, in 1935 this number had been reduced to 4 With approximately 100,000 attendances a year, the number of patients with scurvy encountered each year approximates 7 It is the constant educational work of the medical practitioner and of the health authorities, bringing to the attention of every mother that she should give her infant fish liver oil and citrus fruit or tomato juice daily that has reduced the incidence of these diseases to the vanishing point However, as the present chapter is concerned primarily with nutrition in relation to health, these disease conditions are mentioned only in passing

CLINICAL SIGNS OF MALNUTRITION

During the past few years a number of clinical signs which can result from nutritional deficiencies particularly vitamin deficiencies, have been recognized These conditions differ from the well known deficiency diseases in a number of respects Most of these signs are not specific, that is, a number of factors other than malnutrition may be involved in their production However, it is important for the practising physician to recognize that these changes can result from a nutritional deficiency Another point to be kept in mind is that the severity of the nutritional deficiencies required to produce these signs is not as great as that required to produce the clear-cut deficiency diseases These milder deficiencies have to be

of essential nutrients or increase the requirement of these nutrients These factors

from enjoying what can be described—for want of a better term—as an optimal level of health It is customary to think of disease on one hand and health on the other and thus overlook the fact that there are many different levels of health

It is much more difficult to measure the effect of nutrition on health than it is to diagnose deficiency diseases or clinical signs of malnutrition There are a number of indices of health but usually they can only be determined by observations carried on over a period of months or even years Starting with the child, growth is an index of health The rate of growth may vary all the way from the maximum inherent in the individual to no growth at all Physical fitness, mental alertness and resistance to many infections are also indices of health These again can vary all the way from the maximum inherent in the individual to obvious lack of physical fitness, mental alertness, and resistance to infection If to these four indices of health, namely, rate of growth, physical fitness, mental alertness, and resistance [illegible]

good health If the level of health is low, he may be referred to as being in poor health although he is not suffering from any disease condition

The state of nutrition is dependent not only on the food eaten but on many other factors, such as the absorption of nutrients from the intestinal tract, their storage, their rate of utilization and their excretion For instance, excessive peristalsis will interfere with absorption, disease of the liver cells with storage, hyperthyroidism and fever with rate of utilization, and diabetes mellitus with excretion The following discussion, however, is limited to the role of diet in nutrition and health There is ample evidence that the average level of health today can be improved through better diet

GROWTH

It is hardly necessary to state that a lack of food will affect the rate of growth of the child Recent studies of children in the liberated areas of Europe who had [illegible]

diet may be so improved that an increased rate and amount of growth result There is ample evidence that on the average the food consumed in Great Britain the United States of America and Canada during the past 25 years is better from the nutritional standpoint than that consumed in the preceding 25 years There has been an increased consumption of milk and milk products, vegetables and fruits *per capita* The increased use of many foods in their raw state, such as in salads and the employment of better processing and cooking procedures has resulted in an increased supply of many nutrients, particularly some of the minerals and vitamins Probably as a result of this improved intake, it is the rule rather than the exception to find the children of today taller and heavier than their parents The records of the University of Toronto show that 1,000 freshmen of an average age of 19 years examined in 1920–21 had an average height of 5 feet 8 inches and an average weight of 138 pounds Seventeen years later, in 1937, in a similar group of

take of ascorbic acid is low, gingivitis, with resultant early loss of the teeth, is almost universally seen, whereas in other areas, such as the British West Indies, where the ascorbic acid intake is high although the diet is deficient in other nutrients, gingivitis is seldom encountered Furthermore, when patients with a mild

TEETH

Nutritional factors

There is probably no disease so prevalent about which less is known of the cause than dental caries A great deal of scientific information has been accumulated which indicates that probably many factors are involved There is no doubt that nutrition plays a large part in the development and prevention of this condition Some observers believe that dental caries is entirely due to local conditions in the

development of these acid producing bacteria and allow the development of

production and maintenance of normal tooth structure and normal saliva are

observations have been reported that a deficiency of vitamin D increases the incidence of tooth decay

Fluorine

Evidence has been advanced in recent years that when fluorine is present in drinking water to the extent of 1–2 parts per million it tends to prevent the development of tooth decay The local application to the tooth of a solution of fluorine produces the same results

NUTRITION IN HEALTH

greater importance from the standpoint of the patient is that these moderate

However, it is not generally recognized that even though a diet may ensure an adequate supply of calories, a moderate deficiency of almost any one of the essential nutrients will impair the physical efficiency of the individual Recent studies on the

Food and Nutrition Board (page 997) *of 1 5 milligrams No evidence of beri beri* developed However, marked impairment occurred in the physical fitness of the individuals When the thiamine intake was raised to 1 0 milligram the capacity for physical work was greatly increased In other studies it was found that a lack of thiamine resulted in symptoms of lack of well being muscle pains and moderate impairment of physical efficiency A lack of the other members of the vitamin B complex was characterized by few symptoms but by marked impairment of capacity for hard work Similar impairment of physical fitness has been noted in individuals receiving a diet over a period of 8 months which supplied approximately *10 milligrams of ascorbic acid daily, an amount sufficient to prevent* the development of any symptoms of scurvy but far below the recommended daily allowance of 75 milligrams It is to be noted that in contrast to an insufficient supply of calories, a lack of individual nutrients in the presence of an adequate supply of calories may take a matter of weeks or even months before *signs of physical impairment become evident*

MENTAL DEVELOPMENT

of

es

learning ability Newborn rats were nursed by mothers who were receiving a *diet* lacking in the vit ... born rats received a diet low in the ... new-born rats were n ... *ill the* newborn rats were weaned and given a perfect diet While the rats which had received the diet deficient in the vitamin B complex did not gain as well as the control rats during the first 4 weeks of life, after that they proceeded to *grow and* develop physically at the normal rate so that at 4–6 months of age, which corresponds to about 10 years of age in human life, the deficient rats were almost the same weight and had the same physical appearance as the control animals However, when the rats were tested as to their ability to learn to go through a maze, a *marked* difference in the performance of the two groups was noted The control group learned to go through the maze on an average of 28 trials, while the rats whose diet had been deficient took 40 trials Other measurements, such as the average time *required, the average number of errors made and the excess distance travelled,* all indicated the same marked difference in the performance of the two groups In other words, a lack of the vitamin B complex during the first 4 weeks of life of these *rats, a period corresponding to the first 2 years in the human scale, impaired their* ability to learn when they were at the comparable age of 10-year old children in the human scale

the same age, there was a gain in height of 1 5 inches and a gain in weight of 5 2 pounds Going back still farther, the average suits of armour which were used in the sixteenth century would hardly accommodate a 15-year-old boy of today

Similar results were obtained in another study in Toronto, when 78,000 schoolchildren were measured in 1939 and the measurements compared with those of

schoolchild at 8 years of age in 1939 Again this study furnishes indirect evidence

lost in cooking

Two groups of children were taken One group continued on the regular diet of the orphanage and the other group, in addition to the regular diet, was given a vitamin B complex concentrate made from wheat germ and brewers' yeast A small capsule weighing only 6 grammes was administered daily to each child in this group *The rate of gain in weight of the control group was essentially the expected* rate, whereas the children who received the additional vitamin B complex grew much faster From this study one can conclude that starting with a diet that is already clearly adequate according to ordinary standards the diet may be so improved that the children grow larger than they otherwise would Diet has a profound effect on growth

PHYSICAL FITNESS

Experience during and since World War II has borne in upon us the close relationship between food intake and physical fitness It has been found that when insufficient food is available production output decreases in direct proportion to the lack of food In planning food rationing this fact has been recognized and steps have been taken to ensure additional food for workers doing heavy manual work. Impairment of physical fitness develops in a matter of days when the individual

trast, those receiving 4,000 calories per day were in perfect physical condition at the end of 14 days

However, it is not generally recognized that even though a diet may ensure an adequate supply of calories, a moderate deficiency of almost any one of the essential nutrients will impair the physical efficiency of the individual Recent studies on the effect of an insufficient supply of members of the vitamin B complex on the capacity for physical work are striking Individuals were placed on a diet low in thiamine which supplied approximately 0 45 milligram per day (0 22 milligram per 1,000 calories of the diet) in comparison with the recommended daily allowance of the Food and Nutrition Board (page 997) of 1 5 milligrams No evidence of beri beri developed However, marked impairment occurred in the physical fitness of the individuals When the thiamine intake was raised to 1 0 milligram the capacity for physical work was greatly increased In other studies it was found that a lack of thiamine resulted in symptoms of lack of well being, muscle pains, and moderate impairment of physical efficiency A lack of the other members of the vitamin B complex was characterized by few symptoms but by marked impairment of capacity for hard work Similar impairment of physical fitness has been noted in individuals receiving a diet over a period of 8 months which supplied approximately 10 milligrams of ascorbic acid daily, an amount sufficient to prevent the development of any symptoms of scurvy but far below the recommended daily allowance of 75 milligrams It is to be noted that in contrast to an insufficient supply of calories, a lack of individual nutrients in the presence of an adequate supply of calories may take a matter of weeks or even months before signs of physical impairment become evident

MENTAL DEVELOPMENT

[illegible] development

of [illegible]

es[illegible]

learning ability Newborn rats were nursed by mothers who were receiving a *diet* lacking in the vitamin B complex By this procedure these newborn rats received a diet low in the vitamin B complex for the first 4 weeks of their lives Other newborn rats were nursed by mothers receiving a perfect diet After 4 weeks all the newborn rats were weaned and given a perfect diet While the rats which had received the diet deficient in the vitamin B complex *did not gain as well as* the control rats during the first 4 weeks of life, after that they proceeded to grow and develop physically at the normal rate so that at 4–6 months of age which corresponds to about 10 years of age in human life, the deficient rats were almost the same weight and had the same physical appearance as the control animals However, when the rats were tested as to their ability to learn to go through a maze, a marked difference in the performance of the two groups was noted The control group learned to go through the maze on an average of 28 trials, while the rats whose diet had been deficient took 40 trials Other measurements, such as the average *time* required, the average number of errors made and the excess distance travelled all indicated the same marked difference in the performance of the two groups In other words, a lack of the vitamin B complex during the first 4 weeks of *life of these* rats, a period corresponding to the first 2 years in the human scale, impaired their ability to learn when they were at the comparable age of 10-year old children in the human scale

The effect of a poor diet on the mental outlook of individuals is marked The

themselves but on their officers They could see other groups of men who had received adequate diets marching vigorously along toward the end of each day's manoeuvres, while they could hardly drag one foot after the other Their reaction was that the other men had cheated Everything was wrong except themselves

Recently a number of studies on humans have demonstrated that individuals on a low intake of thiamine become irritable and morose In a study of pregnant women made in Toronto, women were observed who were receiving a diet low in a number of nutrients, including thiamine, calcium and iron The caloric intake was also somewhat below the desired level When their diets were improved, the first

RESISTANCE TO INFECTION

As to the effect of diet on resistance to infection, there are many hundreds of references in the literature One study conducted at the Hospital for Sick Children, Toronto, illustrates this relationship Litter mates of rats were divided into two

In other words, animals in the latter group received an adequate diet After the rats had been on these respective diets for 4 weeks, they were then given a measured amount of a disease-producing organism, *Salmonella muriotitis*, and the number of survivors was noted

When the diet was deficient in vitamin A, 40 per cent of the animals survived compared to 79 per cent of those on an adequate diet In another year, using dif-

there was some casein added to the diet This study demonstrates that a low intake of a number of the vitamins, a low intake of minerals, and a change in the quality of the protein all can lower resistance to infection

Almost invariably poorly fed population-groups have a high prevalence of tuberculosis In Newfoundland, where in 1944 evidences of poor nutrition were found, the prevalence of tuberculosis was relatively high. A similar relationship

was found in the Canadian bush Indian However, other aetiological factors probably are involved A racial susceptibility to tuberculosis has been advanced as an explanation for its prevalence with certain aborigines Attention has also been directed to the fact that very poor nutrition is accompanied by poverty and resultant poor sanitation and poor housing In Great Britain during World War II housing deteriorated markedly but nutrition was at a higher level than before the War The prevalence of tuberculosis did not increase to any appreciable degree In contrast, since the War, the Germans, who long were considered to have a racial resistance to tuberculosis, have suffered not only from poor housing but also from poor nutrition, and the prevalence of tuberculosis has soared Nutrition has a profound effect on resistance to infection

REPRODUCTIVE ABILITY

It has long be...

available from studies conducted in Canada, the United States of America and Great Britain Regarding the Canadian investigation, women coming to a large pre natal clinic in Toronto were studied from the standpoint of their dietary habits A record was kept of the amount of food eaten for a period of one week, and with this information the average daily intake of a number of nutrients was calculated It was found that approximately one half of the women attending this pre-natal clinic were taking a diet which according to our present standards was not compatible with good health Their average caloric intake was only 1,600–1,700 calories per day, in place of the recommended 2,500 calories, their protein intake was only 55 grammes per day, in place of the recommended 85 grammes, their thiamine intake was only 1 milligram per day, compared to the recommended 1 8 milligrams their calcium intake was only 0 5 gramme, instead of the recommended 1 5 grammes per day, and their iron intake only 10 milligrams, in place of the recommended 15 milligrams per day The women with these inadequate diets were then divided into two groups the first of which was called the ' Poor Diet Group ', and these were allowed to continue on their regular dietary intake, the second group

to the level of the recommended daily allowances

the women belonged During the latter stages of pregnancy, when subsequent dietary surveys were made, it was found that the diets of the Poor Diet Group had only slightly improved the caloric intake having increased from 1,600 to 1,900 per day, the protein intake from 55 to 64 grammes per day, the thiamine intake from

ceived adequate diets marching vigorously along toward the end of each day's manoeuvres, while they could hardly drag one foot after the other Their reaction was that the other men had cheated Everything was wrong except themselves

ance They were also much more cheerful

Resistance to Infection

As to the effect of diet on resistance to infection, there are many hundreds of references in the literature One study conducted at the Hospital for Sick Children, Toronto, illustrates this relationship Litter mates of rats were divided into two groups One group received a diet which to the best of our knowledge was adequate except for the nutrient to be tested, which was lacking in the diet The litter mates received the same diet but with additional amounts of the nutrient to be tested

survivors was noted

When the diet was deficient in vitamin A, 40 per cent of the animals survived compared to 79 per cent of those on an adequate diet In another year, using different dosages, because the dosages had to be regulated very carefully (if too large a dose was given all the animals were killed, if too small a dose, they all survived), when the B complex was reduced, 20 per cent survived as compared to 72 per cent surviving when the diet was perfect When vitamin D was lacking in the diet, 28 per cent survived as compared to 55 per cent of the litter mates that were on the perfect diet When the minerals were low, 54 per cent survived as compared to 87 per cent when the diet was perfect When the animals obtained all their protein from sources other than animal protein, 40 per cent survived as compared to 90 per cent when there was some casein added to the diet This study demonstrates that a low intake of a number of the vitamins, a low intake of minerals, and a change in the quality of the protein all can lower resistance to infection

Almost invariably poorly fed population-groups have a high prevalence of tuberculosis In Newfoundland, where in 1944 evidences of poor nutrition were found, the prevalence of tuberculosis was relatively high A similar relationship

could be desired, as they are dependent to a degree on the statements of the mothers themselves The records indicate, however, that the babies from the mothers who had been poorly fed during the pre natal period were more subject to frequent colds, bronchitis, pneumonia and anaemia than the babies from the mothers who had been well fed during the pre natal period

The most striking results of the whole study, however, were, first, that there were

maturity)—every infant lost coming from the mothers who had been poorly nourished *during the pre-natal period*

We thus have evidence that a diet good enough to prevent the development of any clinical entity or well recognized disease condition can definitely affect the efficiency of the pregnant woman in producing healthy offspring

LONGEVITY

We have defined the healthy individual as one whose rate of growth, physical

addition, we might expect the healthy individual to live longer Studies conducted over many years with animals have demonstrated this to be true Rats fed a diet ground whole-wheat table salt

clusion is as follows Hence it may be regarded as

the world have demonstrated that poor nutrition is accompanied by

of old age and a shortening of the span *of life*

The difficulty of measuring the level of health of a patient has been emphasized In fact, it might even be said that it is practically impossible to determine whether *or not an individual is enjoying perfect health* However, it is abundantly evident that the physician's role must go far beyond the consideration of nutrition in

the individual and thus create a problem which frequently only
solve

FREDERICK F TISDALL

5 to 0 7 gramme

The obstetricians gave a rating of the condition of the patients during the pre-natal period, during labour and during convalescence The ratings during the pre natal period were based on the following "good' indicated that the patient had progressed satisfactorily, 'fair' indicated that minor complications had developed during the period of observation, "poor' meant that many or major complications had developed, while 'bad' indicated that serious complications en-

numerous minor complaints Similar ratings were given for labour and postpartum convalescence The major complications during labour were miscarriages, premature births, postpartum haemorrhage long labour, primary uterine inertia, and the requirement of intravenous injection of fluid or of blood The complications during convalescence were severe anaemia, pelvic inflammation, breast inflammation, cystitis or pyelitis, phlebitis, impetigo, embolism or thrombosis and streptococcal vaginitis

When the study was completed, the results were tabulated The ratings were grouped into two divisions, those which were recorded as "fair" or "good' and those recorded as "poor" or 'bad" It is again emphasized that the obstetrician had no idea as to which group the women belonged at the time of their examination It was found that 36 per cent of the women who had received a poor pre natal diet

poor or bad record during labour, as compared to only 3 per cent of the mothers who had received a good pre-natal diet The average duration of labour for the primipara in the Poor Diet Group was 20 3 hours, as compared to the much shorter period of 15 2 hours for the women in the Supplemented Good-diet Group For the multipara, comparable figures were 11 1 and 9 5 hours During the 2 weeks' convalescent period, 11 5 per cent of the mothers in the Poor Diet Group had a poor or bad record as compared to only 3 5 per cent of the mothers who had received the good pre-natal diet

In regard to the effect of the pre-natal diet on the health of the new born child, during the first 2 weeks of life, while in the hospital, 14 per cent of the babies from the mothers who had been poorly nourished had a poor or bad record, whereas none from the mothers who had been well nourished had such a record

For 4 weeks after the mothers left the hospital, the supplementary food was continued with the one group of mothers As far as could be determined, the new born

likely to be more effective if its contact with the worm is prolonged If the drug is left in the gut it may be absorbed and cause toxicity

Consequently, whatever anthelmintic is employed, three stages in the treatment should be observed

Preparation of the patient —The aim is to remove particulate matter and mucus, which may protect the head of the worm from contact with the drug No solid food is allowed for 48 hours before the drug is given, fluids may be given liberally, and glucose should be added to them The bowel is cleared by a vigorous saline purge (1 ounce of magnesium sulphate) 2 hours before the anthelmintic is given

Administration of the anthelmintic —The drug is better given in 3 divided doses at half-hourly intervals, rather than as a single draught, in order to prolong the exposure of the worm to it This procedure has the added advantage that in the event of personal idiosyncrasy treatment can be stopped before the full dose is reached

Removal of the drug and of the worm —One hour after the last dose of the anthelmintic another vigorous saline purge (1 ounce of magnesium sulphate) is given to

appear in the stools within a few weeks

Specific treatment

Extractum Filicis (B P) —The use of male fern (*Dryopteris filix-mas*) as a vermifuge dates back to at least 400 B C, and an ethereal extract of it is still the most effective preparation available for the removal of tapeworms The dose for an adult is 90 minims (6 millilitres), preferably given in 3 doses of 30 minims (2 millilitres) at half-hourly intervals The drug may be given in gelatin capsules, or it may be taken in suspension in a small volume of water As it is nauseating its adminis-

dered in some cases

(*Punica granatum*) bark has also

alkaloidal principles include pelletierine, and the *British Pharmacopoeia* preparation contains the tannates of this and of the other alkaloids The full dose is 8 grains (0 5 gramme) given in 3 divided doses at half-hourly intervals Pelletierine is said to be unsuitable for children, to whom it may prove unduly toxic It may be used as an alternative to filix mas

THE NEMATODE INFESTATIONS

Ascaris lumbricoides —This large roundworm is found throughout the world The adult male and female parasites inhabit the lumen of the small intestine Eggs are passed in the stools, and these after a time become infective on being swallowed From each egg then emerges a larva which pierces the intestinal wall, and is carried in the circulation to the lungs where it lodges The larvae enter the alveoli, ascend the air passages and are reswallowed Odd adult worms may be vomited or voided per rectum, so revealing the infection to the patient

In their migration the larvae, if numerous, may cause a verminous bronchitis or pneumonitis, with expectoration of blood-stained sputum The adult worms

PARASITES, INTESTINAL

HELMINTHIASES—INTESTINAL

DEFINITION

Human worm infestations may conveniently be divided into two types, intestinal and systemic Representatives of the cestodes, the nematodes and the trematodes are to be found in each of these forms of parasitization In some cases the same parasite at different stages of development may be either intestinal or systemic Every adult worm comes from a source outside the body in the form of an egg or of a larva, which enters either by being swallowed or by passing through the skin, according to the species of worm involved Light helminth infestations, particularly with the intestinal parasites, are usually harmless

THE COMMONER INTESTINAL HELMINTHIASES

The Cestode Infestations

Taenia saginata—This, the commonest tapeworm of man, is acquired by swallowing *Cysticercus bovis* in measly beef Only in the adult stage does it parasitize man, in whom it lives by attachment by suckers to the mucosa of the small intestine

from cysticercosis

Diphyllobothrium latum—The fish tapeworm occurs in man in the adult stage only infection results from eating fresh water fish infested with the larval plerocercoids

The presence of a tapeworm is revealed by the passage of gravid segments of the worm in the stools The identity of the worm is established by a study of the detailed morphology of these segments

Prophylaxis

The prevention of tapeworm infestations lies in the thorough cooking of all meat and fish foods before consumption

General treatment

Drugs used for the eradication of intestinal worms should be lethal to the worms, but they should not affect or be absorbed by the host There is no entirely satis-

ment for an intestinal tapeworm is more probable if certain facts are borne in mind The drug must reach the head of the worm to produce effective action The drug is

likely to be more effective if its contact with the worm is prolonged If the dr
is left in the gut it may be absorbed and cause toxicity.

Consequently, whatever anthelmintic is employed, three stages in the treatm
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Removal of the drug and of the worm —One hour after the last dose of the antl
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remove the drug and to sweep the worm from the bowel

The patient should be confined to bed and should use bed pans throughout
whole period of treatment When possible all stools are kept during treatment
for 48 hours after it, and these are searched for the head of the worm If treatm
has been unsuccessful the head of the worm will be retained and segments will
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occasionally give rise to allergic manifestations, or, mechanically, they may cause various troubles such as volvulus, obstruction, or rupture of the gut in children

Ankylostoma duodenale and Necator americanus —The adult hookworms attach themselves to the mucosa of the small bowel, from which they derive blood as

Enterobius vermicularis —The threadworm is an extremely common parasite of man The sexually mature worms infest the large bowel, from which the parturient

establishes itself in the intestine without migration

Prophylaxis

Individual threadworms live for only a couple of months, and continuous re-

dissemination of the infection An infected individual should wear protective clothing at night to prevent scratching and reinfection by the fingers. Purgation with calomel, and rectal enemas of soap and water or of strong salt solution (3–5 per cent sodium chloride), mechanically will remove many adult worms The enemas should be given daily for some days, and repeated at intervals as necessary; they should be given concurrently with specific drug treatment

General treatment

While under treatment for Ascaris or for hookworm infections the patient should be confined to bed, and before any anthelmintic is given he should receive a thorough physical examination Diseases of the heart, the liver or the kidneys, and such conditions as pregnancy, are contra indications to the use of certain anthelmintics It is unnecessary to starve the patient completely before the treatment.

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Ankylostoma duodenale and Necator americanus —The adult hookworms attach themselves to the mucosa of the small bowel, from which they derive blood as nutriment If the number of worms is great (many hundreds or some thousands) and the infection is prolonged, anaemia and the classical picture of hookworm disease may result Infection takes place by the passage of infective larvae from the soil through the skin This may cause temporary skin lesions at the sites of entry

man The sexually mature worms infest the large bowel, from which the parturient female worms emerge through the anus, especially at night They liberate their

Prophylaxis

The dissemination of Ascaris and of hookworm infections can be prevented by the proper disposal of human faecal matter. The drug treatment of infected popu-

infection is therefore necessary for the maintenance of an infection in an individual. Self-reinfection readily takes place and the infection spreads from one member of a household to others Scrupulous personal cleanliness, and the daily boiling of under-

with calomel, and rectal enemas of soap and water or of strong salt solution (3–5 per cent sodium chloride), mechanically will remove many adult worms The enemas should be given daily for some days, and repeated at intervals as necessary; they should be given concurrently with specific drug treatment.

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Specific treatment

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infection is therefore necessary for the maintenance of an infection in an individual Self reinfection readily takes place and the infection spreads from one member of a household to others Scrupulous personal cleanliness, and the daily boiling of underclothing and of bed linen and towels, will do much to prevent the maintenance and dissemination of the infection An infected individual should wear protective clothing at night to prevent scratching and reinfection by the fingers Purgation with calomel and rectal enemas of soap and water or of strong salt solution (3–5 per cent sodium chloride), mechanically will remove many adult worms The enemas should be given daily for some days, and repeated at intervals as necessary; they should be given concurrently with specific drug treatment.

General treatment

While under treatment for Ascaris or for hookworm infections the patient should be confined to bed, and before any anthelmintic is given he should receive a thorough physical examination Diseases of the heart, the liver or the kidneys, and such conditions as pregnancy, are contra indications to the use of certain anthelmintics It is unnecessary to starve the patient completely before the treatment Alcohol and absorbable oils and fats must rigidly be avoided, glucose should be given liberally A light easily assimilable diet is given the day before treatment, on the evening of this day a saline purge (½ ounce of magnesium sulphate) is given

themselves in the bowel

Specific treatment

Carbon Tetrachloride (B P) —This preparation (CCl_4) was introduced by Hall (1921) it soon became widely employed in the treatment of the human hookworm infestations but is rather less effective against Ascaris The drug is given as a draught the dose is 3 millilitres for an adult and 3 minims for each year of age for a child Its use is contra indicated if there is hepatic cirrhosis or nephritis

Tetrachlorethylene (B P C) —This preparation a somewhat similar compound (C_2Cl_4) is even more effective and is said to be less toxic than carbon tetra chloride Its use and dosage are similar

Oleum Chenopodii (B P C) —This oil the active principle of which is ascaridole is prepared from American wormseed (*Chenopodium ambrosioides* var *anthelmintic cum*) The dose for an adult is 2 millilitres and that for children 2 minims for each year of age The use of the drug is contra indicated in pregnancy and it must not be given if there is organic heart disease or liver or kidney disease Oil of chenopodium is effective against Ascaris and against the hookworms but it is rarely used alone and is usually given in conjunction with either tetrachlorethylene or carbon tetrachloride

[illegible]

of oil of chenopodium may be administered in ½ fluid ounce of liquid paraffin the paraffin serves as a vehicle for the drugs and not being an absorbable oil it does not increase their toxicity

Hexylresorcinol (B P C) —Much favoured in America as a safe anthelmintic this drug can be given to patients in whom the drugs already mentioned are contra indicated Although not very effective against Ascaris and the hookworms it is said to destroy the threadworm (*Enterobius*) It is dispensed in pills each containing 1½ grains (0 1 gramme) up to 15 grains are given as a single dose to an adult the dose for children below 6 years of age is up to 8 grains and that for children aged 6–10 years is up to 12 grains

Viola Crystallina (B P C) —Medicinal gentian violet has been widely advocated as an anthelmintic for the eradication of threadworm infestation The dose for an [illegible]

the age of the child

Phenothiazine —Extensively used as a nematode vermifuge in veterinary practice this drug was found by Manson Bahr (1940) to be very effective against the human threadworm He advocated 8 grammes daily for 5 days for adults for children under 8 years 2 grammes daily for 7 days and half this dose for children under 4 years Hubble (1941) found it equally effective but considered it too dangerous for general use as it may produce a severe haemolytic anaemia and toxic hepatitis Paediatricians therefore have given up the use of this drug

Summary of drug treatment

It will be gathered that the drug treatment of threadworm infestation is not altogether satisfactory Of the available drugs hexylresorcinol in hard gelatin capsules preferably in conjunction with daily high rectal enemas of 5 per cent sodium

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chloride, is safe and reasonably effective provided that adequate precautions are taken to break the cycle of reinfestation along the lines already indicated In the absence of these precautions the benefit of drug treatment, however effective the drug may be in destroying the adult worms, is but temporary Cross infection or reinfection very readily occurs When one person in a household is found to harbour threadworms it is probable that the others also do so An infection is detected by examination of the perianal and perineal skin for eggs, either by scraping or by the use of the Cellophane NIH swab All infected persons in a household should be treated simultaneously

Hall, M C (1921) *J agric Res*, 21, 157
Hubble, D (1941) *Lancet*, 2 600
Manson Bahr, P (1940) *Lancet* 2, 808

HELMINTHIASES—SYSTEMIC

THE CESTODE INFESTATIONS

Taenia solium

Cysticercus cellulosae, the larval form of *T solium*, may parasitize man alterna-

the adult worm, and by proper sewage disposal to prevent the dissemination of the eggs from those infected The treatment of the established cysticercal infection is purely palliative

Echinococcus granulosus

Hydatid cysts occur in man, and in other animals, over many parts of the world

rms, which parasi-
, the cysts usually

Treatment —Prophylaxis lies in the avoidance of infection of dogs by preventing their consumption of hydatid infected carcasses, and in their treatment for infestation with adult worms if these are acquired

The treatment of hydatid cysts in man when necessary and practicable, is surgical Care must be taken not to diffuse the infection by allowing material within the

THE NEMATODE INFESTATIONS

Trichinella spiralis

The adult worms are acquired by swallowing encysted larvae in infected pork, symptoms of the infection appear when the female worms, which develop in the gut wall, become parturient some days after infestation, for about 6 weeks these produce larvae which are disseminated in the circulation In muscle they encyst,

and after 6 months they begin to die, they continue to disintegrate or to calcify over a period of years Light infestations are common and give rise to no more than passing ill health and muscular pain Heavy infestations cause grave illness and even death

Treatment —The boiling of all swill prior to feeding to pigs will reduce the incidence of infection in these animals, and so lessen the risk of human infestation Prophylaxis depends on the avoidance of infected pork, and on the thorough cooking of all pork before consumption Immediate vigorous purgation after eating infected pork may lessen the intensity of any infestation, but there is no means of eradicating the larvae once they get into the circulation and are distributed throughout the body

Wuchereria bancrofti

Bancroftian filariasis is widespread in the tropics Certain mosquitoes serve as intermediate hosts and convey the larval worms to man The adult worms which develop from these, inhabit the lymphatics, if present in considerable numbers they may give rise to the classical picture of filarial disease with manifestations of gross lymphatic obstruction The microfilariae produced by the parturient female worms circulate in the peripheral blood, usually only at night, and give rise to no pathology They are infective to the mosquito vector, but they do not develop further in man

Treatment —Prophylaxis lies in avoidance of known endemic areas or, if in these, in personal protection against the vectors by the use of insect repellents and of bed netting at night The [illegible]
infected is usually followed [illegible]
symptoms and signs in the e[illegible]
infestation which leads to gross filarial disease and its terminal sequelae

The treatment of the grosser manifestations of filariasis is palliative Lymphangitis and oedema may be controlled by rest, elevation massage, and tight bandaging of the affected part As a result of these measures in the early stages these symptoms may disappear, and in the absence of further infection the prospect of permanent relief is good With the development of recurring attacks of lymphangitis with fever, of elephantiasis, of filarial abscesses and similar manifestations treatment is much less satisfactory The sulphonamide drugs and penicillin may alleviate complications associated with secondary bacterial infection Elephantoid excrescences in advanced cases may be removed surgically to obtain a cosmetic result or to enable the patient to move more freely

[illegible]

ing results have been achieved by dosage to a toxic level with certa[illegible] antimonials, of which Neostibosan has so far proved the most satisfactory (Culbertson and his co workers, *1947) It has been found that certain pentavalent* arsenicals will also serve this purpose more recently hetrazan, 1 diethylcarbamyl 4 methylpiperazine hydrochloride, has shown some promise as a filaricide

Loa loa

This filarial parasite is very common in the riverine areas of West Africa and Central Africa where it is conveyed from man to man by certain biting flies The adult worms move about the body in the subcutaneous and connective tissues The

chloride, is safe and reasonably effective provided that adequate precautions are taken to break the cycle of reinfestation along the lines already indicated In the absence of these precautions the benefit of drug treatment, however effective the drug may be in destroying the adult worms, is but temporary Cross-infection or reinfection very readily occurs When one person in a household is found to harbour threadworms it is probable that the others also do so An infection is detected by examination of the perianal and perineal skin for eggs, either by scraping or by the use of the Cellophane NIH swab All infected persons in a household should be treated simultaneously

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S mansoni

Intestinal bilharziasis is due to infestation with this parasite of venules, particu larly of the inferior mesenteric vein draining the large bowel, the lateral spined eggs produced by the female worms normally find their way into the lumen of the large bowel, and are voided in the faeces Bilharzial dysentery and Egyptian splenomegaly are classical manifestations of the infection The snail vectors of the intestinal parasite are various species of *Planorbis*

S japonicum

Limited to the Far East, this worm chiefly inhabits venules of the superior mesenteric vein draining the small bowel The ova produced by the females are very numerous, and normally gain the exterior by passage into the lumen of the small intestine Many, however, are carried in the portal circulation to the liver, where they give rise to marked periportal fibrosis Severe enteritis and widespread inflammatory lesions in the abdomen may result from infestation with this parasite. The diagnosis is made by recovery of the spineless ova in the stools, the snail vectors include species of *Katayama* and *Oncomelania*

TREATMENT

Prophylactic

No wading, bathing or even wetting of the skin in possibly contaminated waters should be permitted When it is necessary to enter such water, completely water proof protective clothing must be worn *All water from suspected sources of infec*

the

marks the presence of the attacking larvae It is probable that the prompt applica *tion of disinfectant to the skin immediately after exposure to infection* would destroy the larvae before they completely penetrate it While the larvae are migrat ing in the body a few injections of one of the drugs used in the treatment of the *established infection may prove effective in aborting it*

General

Palliative treatments suitable to the type of infection should be given to the by the use of the

ervention may

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ted from such

measures Even when the adult worms have been destroyed by specific treatment, many eggs, which are the agents essentially responsible for the pathology of the bilharziases, remain in the tissues as *foreign body irritants, and dead eggs* continue to be excreted over long periods The criterion of successful specific treatment therefore is not the total absence of eggs, but the absence of viable eggs

Specific

Antimony—In 1915 McDonagh recorded the cure of a number of cases of bil harziasis with tartar emetic (antimony potassium tartrate) in 1918 these results were

female worms give birth to microfilariae, which are found in the peripheral blood These develop further only in the insect vector. The manifestations of infestation in some cases may be negligible, in others Calabar swellings and various allergic manifestations periodically appear.

Treatment —In their wanderings about the body the adult worms may pass under the palpebral or the orbital conjunctiva They are felt by the patient, and can clearly be seen by an observer When this occurs the worm is seized by forceps, and removed through a snip in the conjunctiva If the worm has vanished into the

the mouth for 7–10 days, has been stated to afford immediate relief from symptoms and in some cases to destroy the adult worms Occasional generalized reactions, with nausea, arthralgia, diarrhoea and fever, attend its use, but these disappear within a couple of days

Onchocerca volvulus

Occurring in wide areas of tropical Africa and South America, the adults of this filarial worm collect together and are found in fibrous nodules in the subcutaneous tissues The microfilariae radiate for some inches from the nodule into the superficial layers of the surrounding skin Certain biting-flies (*Simulium* spp) on ingesting these microfilariae become infected and eventually transmit the infection. If the nodules are on the trunk they cause nothing more than mechanical inconvenience by their presence If, however, they occur on the head or neck, the eyes may be extensively invaded by larvae, and progressive ocular changes result in filarial blinding

Treatment.—When located, the nodules with the contained worms can readily be

worms in such cases

THE TREMATODE INFESTATIONS

Schistosoma haematobium

further development and multiplication of the larvae in the snails These second-stage larvae (cercariae) escape from the snail into fresh water, and, on gaining contact with the skin of man, penetrate it and migrate to the appropriate area as adult worms

PERITONEUM DISEASES

ACUTE GENERAL PERITONITIS

Acute general peritonitis is most often secondary to the rupture or inflammation of an abdominal viscus such as the appendix The treatment is surgical

MEDICAL MANAGEMENT OF ACUTE GENERAL PERITONITIS

Although the details of medical management may vary in each individual case the basic principles are essentially the same *This is so whether the infection is* primary or secondary and whether an operation is performed or not

Chemotherapy

Penicillin by intramuscular injection and sulphonamides in the intravenous fluid *infusions (see below) are given as required*

Bed and position

The patient is kept in bed at complete rest Opinions as to the best position differ, but, whatever the theoretical arguments against it, there is little doubt that the semi Fowler position is the one most welcomed by the patient

Feeding

No food or fluid should be given by mouth, the fluid balance is made up by *parenteral fluid*

Pain

The progress of pain is a valuable indication of the progress of the disease
... small doses of morphine
... y, but
... ich in
... o the
abdomen may be an added comfort

Bowels

Laxatives must not be given The bowels can be controlled by simple enemas or glycerin suppositories A rectal tube may ease discomfort

Distension

Gastro intestinal drainage is an extremely important measure Ideally when dis
... sed into the small intes
... nefit to the
... often, how-
... cult that the
distress caused to the patient is unwarranted In such cases it is better to use a Ryle tube passed through *the nose into the stomach* Continuous drainage, with a pressure corresponding approximately to a 5 foot column of water, is preferable to

confirmed by the independent work of Christopherson Thereafter tartar emetic treatment was accepted as specific in the treatment of all three forms of this disease The course usually given, after 2 initial smaller doses, consists of intravenous injections each containing 2 grains of the drug in a 2–6 per cent solution, 3 injections are given each week at intervals of a couple of days, until a total of 25–30 grains

ive rise to

vomiting,

hich have

even proved fatal The patient should be confined to bed on the days of the injections, and be given a light diet with liberal amounts of glucose

Sodium antimony tartrate was later found to be as efficacious as, but rather less toxic than, the potassium salt, and it is now largely used in preference to it The dosage and method of administration are similar

An intensive course of sodium antimony tartrate treatment lasting only two days has been devised by Alves and Blair (1946) who have reported very favourably on

with the more prolonged dosage

The tartrate solutions must be newly prepared in freshly distilled water and should not be boiled for long or they will become unduly toxic They are extremely irritant so the injections must be made with the greatest care into the lumen of the vein, otherwise sloughing may occur When intravenous injection is not possible, as in young children these drugs cannot be employed

The non-irritant, and much less toxic pentavalent salts of antimony have not proved of value in schistosomiasis, but certain trivalent salts considerably less irritant than tartar emetic are effective Of these stibophen (Fouadin, Neoantimosan), a 6

sodium disu

thiomalate,

smaller doses, is given intramuscularly or intravenously in doses of 5 millilitres, daily or on alternate days, for 10 or 15 injections, the latter is similarly given in doses of up to 2 millilitres (0 01 gramme of metallic antimony), twice or thrice weekly, for 12 or 20 injections

A. R D ADAMS

Alves, W, and Blair D M (1946) *Lancet*, 1, 9

It would be supposed that the *more exudative form* would lead ultimately to intestinal obstruction, but strangely this is rare

OTHER AFFECTIONS OF THE PERITONEUM

Other affections of the peritoneum need scant mention because treatment is either that of a more widespread disease or merely symptomatic *Carcinomatous involvement of the peritoneum, with or without ascites,* may be difficult to diagnose Rare affections include actinomycosis (*see* page 902) polyserositis or Concato s disease, which is often tuberculous, and low grade *chronic proliferative peritoneal* reactions of doubtful aetiology seen in chronic alcoholics and others particularly in those *with long standing ascites*

E. R. CULLINAN

SUBPHRENIC ABSCESS

DIAGNOSIS

The detection of infection beneath the diaphragm is often difficult because of the overshadowing manifestations of the condition which has led to it (for instance

determ ned by the anatomical relationships of the uppe

common in the abdomen when the infection is below the liver On the left side this difference is less striking, infra hepatic infection spreads easily to the diaphragm by passing forwards between the liver and the stomach with the result that intra thoracic complications are fairly common Infra hepatic infection on either side *carries a high mortality caused by its association with serious abdominal disease* As several viscera lie beneath the left dome of the diaphragm (as contrasted by one

and these where omical

spaces, if therefore drainage of an abscess in one space is not fo overy the possibility of infection in one of the other spaces must be borne in mind Occasionally an underlying cause cannot be found for a subphrenic abscess this must mean that there has been infection which has spread to the subdiaphrag

has subsided The bscess may persist mpyema or lung

abscess can attention to the p i from below the diaphragm It may indeed rupture into a bronchus into the gall bladder (for ex ample broncho biliary fistula) or into the stomach, or rarely it may point on the surface of the body

intermittent drainage, though more difficult to manage It stops the vomiting, lessens the liability to distension of the small bowel, and helps to dispel the distension when it has developed

Fluid balance

The water and electrolyte balance, gravely disturbed, must be rectified with parenteral fluids, details are given on page 534 In estimating quantities it is essential to allow for the additional loss from gastric or intestinal drainage

Blood and plasma transfusions

Loss of protein may be severe, and should be replaced with plasma if the haemoglobin reading is high and with blood if the reading is low

Length of treatment

PNEUMOCOCCAL PERITONITIS

Occasionally peritonitis is seen as an apparently primary disease in which the pneumococcus is usually the responsible organism Acute pneumococcal peritonitis affects young people particularly girls under the age of 10 years The cause is often mysterious though it is sometimes assumed that the infection has reached the peritoneal cavity by way of the genital tract In the early stages of this disease the child is profoundly ill with irregular fever, vomiting and maybe, delirium When the

abscesses are drained

TUBERCULOUS PERITONITIS

Unless tuberculous infection of the peritoneum is part of a general miliary spread or r
usually chr
and vary f
massive peritoneal effusion

Treatment

Patients are treated on the same general lines as is tuberculosis elsewhere in the

open the abdomen and close it again This operation has been largely abandoned on grounds of illogicality, but it must be confessed that surprisingly good results often seemed to result from it

PHYSIOTHERAPY

ARTIFICIAL FEVER

A high temperature is a sign of a disease process and somewhat naturally creates anxiety when it appears and relief when it disappears The general assumption is that fever is bad for the patient and aids the infecting organisms in their task On the other hand there is a general belief that if the patient has a [illegible]

gonococcus, are easily killed at a temperature of 105° F or higher The common *bacteria are not killed at this temperature though* Koch-Weeks bacillus and *Haemophilus influenzae* and the haemolytic streptococcus occasionally grow less well at 105° F than at lower temperatures In the other conditions, such as chorea, rheumatic fever, disseminated sclerosis and rheumatoid arthritis, in which fever is beneficial, the causative agents are not known It seems probable that the body develops its defence mechanism to some diseases better when the temperature is raised and that it is a sign of a healthy reaction on the part of the patient If this view is correct it throws doubt on the time-honoured custom of 'cradling' the patient whenever the temperature is over 104° F and of cold sponging when it is above 105° F in the desire to lower the temperature A patient whose temperature is over 105° F must be carefully watched and the temperature taken frequently, because of the danger of hyperpyrexia developing This is especially likely to occur in hot, damp weather

PRODUCTION OF FEVER

Fever has been used occasionally in the treatment of disease for many centuries and many methods have been devised

Hot Baths

A temperature of 106° F can easily be produced by means of hot baths, and was used at one time in Japan in the treatment of syphilis As a result of careful observations, the use of hot baths has been condemned because of the mortality which occurred even when the patients were being treated by skilled observers

Heated Cabinets

The best known of these is the Kettering Hypertherm, used by Simpson, Kislig and Sittler (1933) The cabinets can be made by good joiners and electricians from the instruction given by Bishop, Lehman and Warren (1935) The body of the patient is enclosed in a cabinet with the head projecting through a hole Air of known temperature and humidity is blown over the patient, and the temperature of the patient can easily be regulated The patient's head can be cooled with an electric fan or by cold compresses This is a good, safe method and relatively comfortable for the patient

Aspiration

Once a subphrenic abscess is suspected, aspiration as a method of diagnosis or of treatment should not be employed It is unreliable, it entails a certain degree of risk of pleural infection, and whether pus is withdrawn or not, operation will be necessary either for diagnostic exploration or for drainage of the abscess

TREATMENT

Drainage

Trans serous drainage across the pleural or peritoneal cavities carries a much higher mortality rate than extra serous drainage (whether by the anterior or the posterior route) This is true even when it appears that the pleural cavity is sealed off by adhesions Harley (1949) has shown that trans-serous drainage is followed by death 3 times as often as extra serous drainage, the latter therefore is the method of choice

Intrathoracic complications (pleurisy, serous effusion, empyema, lung abscess

Medicinal Measures

Subphrenic abscess is a serious infection and a combination of Sulphamezathine and penicillin is given in full dosage, there is no question, however, of postponing drainage of the abscess in order to observe the effect of drug treatment The abscess should be drained as soon as it is diagnosed and the pus examined bacteriologically Medicinal treatment is continued according to the drug-sensitiveness of the infecting micro-organisms

COMPLICATIONS

It has already been pointed out that failure of recovery after drainage of an abscess may mean that there is a further abscess still undrained This may be situated in one of the other anatomical spaces, or it may be in the liver (the subphrenic abscess being secondary to the liver abscess)

In patients in whom intrathoracic complications have occurred the development

ROBERT COOPE

Harley, H R S (1949) *Thorax*, 4 1

arthritis chorea disseminated sclerosis rheumatoid arthritis osteoarthritis and asthma

DISEASES CAUSED BY ORGANISMS WHICH ARE DIRECTLY KILLED BY HIGH TEMPERATURES

The results with general paralysis of the insane tabes dorsalis and meningovascular syphilis are very good and the treatment can be given to all patients who are not

necessary The examination of the blood and cerebrospinal fluid helps to decide the number of treatments necessary The introduction of penicillin has already altered the need for fever in the treatment of syphilis It is possible that fever will be of use only for the old and severe cases which do not improve sufficiently with penicillin or for those patients who are not well enough to have malaria

Gonococcal arthritis

Gonococcal arthritis whether it is in the acute or chronic stage responds to fever in a magical way After two treatments the symptoms of pain in the chronic case disappear completely The acute severe condition in which fever and swollen joints are present may need
its use unnecessary for
persists either in the ur
possible

DISEASES OF UNKNOWN CAUSE BUT WHICH ARE IMPROVED BY HIGH TEMPERATURES

Chorea either in the acute or chronic stage yields rapidly to fever Two fevers at a week s interval cured in two weeks a girl who was dumb and extremely restless and the same number cured a boy who had had a chronic relapsing chorea for 3 years

Disseminated sclerosis improves after fever treatment and 10 treatments may enable a bedridden patient to walk It does not prevent relapses from occurring but treatment can be given again

Rheumatoid arthritis does not respond so well to treatment though some improvement occurs

Osteoarthritis is rarely benefited by fever, it should not be used

Asthma patients with a very severe form of the disease who require adrenaline several times a day to relieve the spasm are considerably helped by a fever The use of adrenaline can be discontinued for a while but the condition relapses very quickly and fever does not seem of any permanent value

CONTRA INDICATIONS TO TREATMENT

A careful physical examination must be made of the patient in order to decide whether he can stand a fever of 105–106° F for 8 hours or more It can be said that a patient who is fit for an abdominal operation is also fit for a fever but special attention must be paid to the following points

(1) The condition of the kidneys The blood urea and the urea clearance must be

ELECTRIC BLANKETS

Electric blankets and radiant heat should not be used if it is desired to produce a general rise of temperature of 105–106° F in the body because of the danger of severe burns or death

HEAT PRODUCED MAINLY IN THE TISSUES

DIATHERMY

Diathermy is very efficient and safe in skilled hands but is very unpleasant for

remembered

RADIOTHERMY

When a patient is placed in an electrostatic field of waves oscillating with a frequency of 10 million–100 million cycles per second the temperature rises steadily The method is efficient but has largely fallen into disuse because of the risk of burns

ELECTRIC FEVER

Inductothermy

better conducting vascular tissues such as muscle and a more evenly distributed rise of temperature is produced and the risk of burns is proportionately less

Preparation of the patient —Treatment is usually given as early as possible in the

repeated 2 or 3 times in the course of the treatment Hyoscine should not be used

10 millilitres should be given intravenously or picrotoxin 3 milligrams intra venously

INDICATIONS FOR TREATMENT

Fever has been advocated in the treatment of the following diseases general paralysis of the insane tabes dorsalis meningo vascular syphilis gonococcal

SIGNS OF INTOLERANCE

Early signs of intolerance to the fever include the following

(1) The appearance of circum oral pallor while the rest of the face remains flushed

(2) A reduction in the sweat, so that the skin of the forehead feels hot and dry

(3) The development of very shallow or Cheyne-Stokes respiration

(4) The rise in the pulse rate to above 170 per minute

(5) Delirium

Any one of these symptoms may be accompanied by a rise in the temperature above 106° F, and if unnoticed and untreated may cause loss of consciousness and a *fatal* hyperpyrexia

The appearance of any unfavourable sign should be treated at once by the following procedures

(1) Directing an electric fan to blow on the face

(2) *Opening the bag or cabinet so as to expose an arm or more of the body to the* draught of air

[illegible] one fifth normal physio- [illegible] value

[illegible] aches [illegible] d the

[illegible] maintained

SELECTION OF ATTENDANTS

From this account it follows that the nurses must be carefully selected and *trained for the work and the medical attendant should be readily available for* advice and treatment (that is, in a hospital he must always be where his "indicator" says he is and come without any delay if called) Under these conditions there is very little danger of any fatality and the nurses and medical attendants very soon learn to look after the patient very skilfully

AFTER TREATMENT

After the patient is taken out of the bag or cabinet he is sponged down and dried He is then usually ready for a good supper, sleeps well as a rule, and feels none the worse the next day It is customary to allow 4 or 7 days to elapse between each treatment, and as many as 20 or 40 fevers may be necessary

LATE COMPLICATIONS

Superficial burns may occur occasionally but these heal easily Herpes labialis is a very common complication and appears about 24 hours after the end of the treatment, it usually heals in 5–6 days In one case only has a corneal lesion been reported (Berliner, 1933) It seems clear that the fever aids the virus to attack the lips and face

The risk to the patient is very small indeed provided that the attendants know how to look after the patients Thus Neyman and his co workers treated 140 patients

was 6 months pregnant survived 20 fevers recovered from general paralysis of the insane and had a healthy child

(5) Feeble and aged patients are also unfit

(6) Patients who are violent should not be treated

DETAILS OF A TREATMENT

London W 1) The flexible coil leading from the Inductotherm is placed over the chest of the patient but separated by a layer of non conducting material towels

temperature reaches 104° F The current is then switched off and if available a

rise after the current is switched off and in favourable cases will reach 105–106° F Temperatures less than 105° F are of little value

The patient must be watched continuously in order to anticipate his wants and to look out for the onset of hyperpyrexia The patients are usually thirsty and may drink 3 000 millilitres of fluid in the course of an 8 hour treatment This is best given in the form of 5 per cent glucose in half strength normal physiological saline solution flavoured with lemon juice or orange juice This will supply 13 5 grammes of salt which is necessary to prevent cramps which may be caused by the great loss of salt in the sweat Tea or meat extract may be given if the patient desires and makes a pleasant change The patient may have a headache which is relieved by a cold compress or by 10 grains of phenacetin Sometimes delirium is a tiresome complication and the second dose of morphine or Nembutal is useful

as a preliminary to mobilization of a joint which has become stiff as the result of injury or prolonged immobilization It is also useful for a variety of painful somatic conditions, and is sometimes employed in the treatment of neurasthenia and insomnia

It should be known that light massage is a measure of great value, both as a

muscle spasm and the condition would be relieved by superficial massage

DEEP MASSAGE

Though the main effect of deep massage is mechanical, it also has reflex action Deep massage is employed to aid venous return and the movement of lymph, to bring about the *resolution of indurations and to stretch adhesions* Reflex vasodilatation follows its use There are three main types of manipulation in common use, namely stroking movements compression movements and percussion movements These will now be considered separately

Stroking movements

These may be superficial or deep As already described, superficial stroking is used to produce relaxation Deep stroking, usually referred to as *effleurage*, is

the treat
ntripetal
lly as the
utes and

Compression movements

There are three kinds of compression movements kneading, frictions and *pétrissage*

Kneading —This is performed by the palmar surfaces of both hands, which in the case of an extremity are placed on opposite sides of the limb Gentle pressure, together with circular movements, is applied to the muscles of the affected part

functional use of the part

Frictions —Frictions are prescribed with the object of assisting the resolution of fibrositic indurations They are performed with the tips of the fingers or thumb, considerable pressure being but not sufficient to cause bruising of the

with by performing a rolling

with general paralysis of the insane with one death (Neyman 1937) Complete remission from the disease occurred in 39 per cent of the patients

FEVER PRODUCED BY PROTEIN SHOCK

prolonged for several hours

A fever can be induced every 3 or 4 days but the dose of the vaccine w ll have to

GEORGE GRAHAM

Berliner M L (1933) *Arch Ophthal Ch cago* 10 365
B shop F W Lehman E and Warren S L (1935) *J Amer med Ass* 104 910
Neyman C H (1937) *Art fic al Fever* London Ba ll ère Tindall & Cox
Simpson W M Kisl g F K and S ttler E C (1933) *Ann intern Med* 7 64

PHYSIOTHERAPY

when to employ them

It is imposs ble to catalogue every phys cal method in use in an article of this *length but the attempt will be made to describe those methods commonly employed* and the indications for their use

Massage and remed al exercises form the fundamentals of physiotherapy and will be dealt with first followed by sections on heat electrotherapy act notherapy and hydrology

MASSAGE

The effects of massage may be reflex or mechanical or a combination of both Though massage can improve the nutrition and general condition of muscle it cannot build it up or increase its strength This can only be brought about by voluntary use or electrical stimulation Massage may be superficial or deep accord ing to the condition being treated and to the effects it is desired to produce

LIGHT OR SUPERFICIAL MASSAGE

Assisted Movements

In the early stages of rehabilitation the patient is frequently unable to perform the desired exercise unaided, on account of muscular weakness When this is the case movement must be assisted until muscle power has recovered This can best be done by eliminating the effects of gravity For example, though the deltoid muscle may be too weak to abduct the arm when the patient is upright, if he lies down with the arm supported the movement can be performed easily Alternatively, the physiotherapist may take the weight of the limb while the patient performs the exercise, or it may be suspended in slings so that both friction and gravity are eliminated The Guthrie Smith suspension apparatus provides for assisted movements and a graded progression to active and resisted exercise

The buoyant effect of water is of great value in the treatment of paralysis resulting from anterior poliomyelitis, and can be similarly employed for a variety of conditions characterized by stiff joints and debilitated musculature

... t be perse ered w th for a prolonged period in the ... f time ... power ... lesired movement against gravity, unaided

Active Exercises

... for the active functional use of the ... conditions the ... tive movement means the active, functional use of the part, the only work ... being in overcoming the effects of gravity or the weight of the body For this reason exercises of this type are often termed ' free", as opposed to those, to be described later, which are performed against an external resistance

Active exercises are employed in the treatment of a great variety of medical and surgical conditions They are indicated as a routine following all orthopaedic procedures, fractures and injuries, the patient performing "static contractions" while the limb is immobilized in plaster Active exercises may be performed individually or in a class, and should be performed rhythmically It is often an advantage if they are done to music Care must be taken that the patient breathes correctly while performing exercises

Resisted Exercises

... frequently fail to restore the full range of movement to the ... is twofold

(1) To increase range of movement by causing relaxation of the opposing muscle groups

(2) To build up muscle power

A resisted movement will always produce greater relaxation in the antagonistic muscle group than a free movement In the case of a stiff elbow there will always be several degrees more extension when the movement is resisted than when it is free

of the body acting as a resistance The quadriceps muscle has to contract through its whole range, against the weight of the body, for the body to regain the upright position

Whatever the method employed, the amount of resistance is increased until full normal function has been obtained According to the position of the body and the effects of gravity, any movement may be assisted, free or resisted Thus when rehabilitating the knee following meniscectomy, if extension is performed when lying down it is an assisted movement, when sitting it is an active movement, while done standing it is a resisted movement

Finally, any scheme of exercises must include the body as a whole and not merely the affected limb or limbs The exercises employed should not be complicated, and where possible should employ a conditioned reflex

FORCED MOVEMENT (MANIPULATION)

When active resisted exercises fail to restore the normal range of movement to a joint, forced movement or manipulation sometimes becomes necessary

Forced movement differs from passive movement in that the joint is moved beyond its normal range and is also put through involuntary movements For example, when the shoulder joint is manipulated, the head of the humerus is pulled away from the glenoid by distraction In this way adhesions are broken, contractions stretched, normal movement restored and pain relieved

Manipulation is also frequently employed in the treatment of painful conditions

prising relief is often obtained, but it must be understood that treatment of this kind is contra-indicated in the presence of an active disc lesion

Technique is important The patient must be fully relaxed and the movement must not be jerky

When a "frozen shoulder" is manipulated under anaesthesia movement is clearly forced, but in certain cases the distinction between passive movement and forced movement is more arbitrary If the spine is gently manipulated, whether by traction or rotation, though at first sight the manoeuvre may appear to be passive, in actual fact it is forced, as the part is moved beyond its full voluntary range

Occipital headache, secondary to cervical "fibrositis" may be relieved by head traction applied manually or by suspension apparatus Dorsal and lumbar pain of myofascial origin also responds to manipulation

OCCUPATIONAL THERAPY AND GAMES

The value of occupational therapy and games in the treatment of joint conditions

ASSISTED MOVEMENTS

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[illegible]
tre [illegible]
in [illegible]
returns assistance is decreased until the patient is able to perform [illegible] movement against gravity unaided

ACTIVE EXERCISES

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means the active fun[illegible]
coming the effects of [illegible]
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OCCUPATIONAL THERAPY AND GAMES

The value of occupational therapy and games in the treatment of joint conditions

movement at the shoulder

patient improves, elbow, shoulder, knee and thigh movements are added After 10 days of treatment, provided the patient is progressing satisfactorily, the exercises should be so graded that they do not raise the pulse rate by more than 12 beats and after 3 weeks by more than 16 beats

When compensation is restored and the patient gets up, the exercises are graded so as not to increase the pulse rate by more than 20 beats

The value of skilfully graduated exercises in the treatment of heart disease cannot be over-emphasized

EXERCISES FOR VASCULAR CONDITIONS

The pain of intermittent claudication is seldom due to thrombo-angiitis obliterans, but though Buerger's exercises were originally designed for the treatment of this condition, they are of definite value when the pain results from other [illegible]

[illegible]

horizontal position the cycle takes 6 minutes to complete It is repeated 6 times and the whole exercise is performed 3 or 4 times a day

EXERCISES FOR NEUROLOGICAL CONDITIONS

A number of chronic neurological conditions, in which muscle sense is impaired, such as tabes dorsalis and disseminated sclerosis, benefit from physical treatment Following massage and passive movements it is customary to employ exercises of the Frenkel type These aim at re educating what muscle sense is left Considerable improvement is sometimes obtained

Spastic conditions of all types, whether due to cerebral haemorrhage, the cerebral paralysis of infancy, or to other causes, can be assisted by physiotherapy if it is persevered with The methods employed are basically massage, passive movements and relaxation exercises as preliminaries to active movements, performed rhythmically

Although the prognosis following cerebral haemorrhage or thrombosis is largely dependent upon the extent of the damage, physiotherapy should always be instituted as in this way contractions and deformities can be prevented

The treatment of the cerebral paralysis of infancy is very specialized Provided [illegible]

Sufferers from the various sequelae of gunshot wounds of the head often derive marked benefit from physical methods

The physical treatment of neurological conditions calls for a high degree of perseverance and concentration The patient may derive great physical and moral assistance from this form of treatment

HEAT THERAPY

Heat has a soothing effect on the majority of painful conditions and is extensively used for this purpose

The body may be heated by conduction, convection, radiation and high-frequency currents A kaolin poultice will relieve the pain of a boil or carbuncle and

inflammatory process

The relief experienced when somatic pain is treated by superficial heat is more difficult to understand To attribute it to reflex action is not altogether convincing, and the pain is often so deeply seated that it is unlikely that the affected part will be heated either directly or by conduction Physiologists offer two possible explanations

(a) "Counter irritation" or "setting a pain to catch a pain" By applying heat to the surface projection of a deep seated pain it may be possible to materially alter the perception of the pain by the higher centres

(b) It has been shown that the passage of impulses along the ascending pathways of the central nervous system can be influenced by concomitant activity in other segments of the nervous system through which the ascending pathways travel Thus, the pattern of information transmitted to the higher centres as the result of stimulation of a point A can be materially altered by the simultaneous stimulation of a point B, although A and B may have totally independent neuronic networks

Methods of Applying Heat to the Body

The following methods of applying heat to the body are commonly employed moist heat, hot wax, dry heat (infra red and radiant heat lamps)

Moist heat

The kaolin poultice, the hot mud pack, and the vapour bath are exsample of moist heat The first two methods heat the body by conduction, the last named by convection

The kaolin poultice is widely used in the treatment of local septic conditions and minor strains and sprains

Pistany is the home of the hot mud pack It is claimed that Pistany mud contains

Vapour baths are prescribed by rheumatologists for the treatment of rheumatic conditions such as chronic fibrositis Vapour baths are given at temperatures varying *from 105° F up to 120° F with the object of causing profuse sweating and* aiding the elimination of products of inflammation They are often followed by the Scotch douche Vapour baths are contra indicated in arteriosclerosis and heart disease

The Faradic Current

Faradism is employed to stimulate muscles that have an intact nerve supply The faradic current is an induced current of high voltage and low amperage, and in its modern form produces almost painless tetanic contractions The Smart Bristow faradic coil, which is in universal employment, produces approximately 40 "pulses per second, each of $\frac{1}{1000}$ second duration Thus, sensory effect is slight The strength of the current is increased by potentiometer control, or by bringing more turns into the secondary winding by means of a switch The current may be "surged" by sliding an iron core in and out of the coil The Smart-Bristow coil is operated by 2 dry cells (3 volts) or by rectified current from the mains

Surged faradism is an invaluable method of exercising muscles which have become weak in consequence of bone, joint or soft tissue injury or disease, operations, or faults in function

Faradism not only builds up muscles that have atrophied in consequence of disease, but by increasing the circulation improves the nutrition of the part The rhythmical contractions aid the removal of extravasations, effusions and oedema Adhesions may be freed by stimulating individual muscles, and stiff joints mobilized When volitional use of a muscle is suppressed by pain, contractions may be initiated by surged faradism and afterwards carried out actively by the patient

Technique varies in different hands Sir Morton Smart (1933) advocates 70–80 graduated muscular contractions per minute for 20 minutes in the treatment of recent injuries, but many authorities prefer 30 contractions per minute for 10–15 minutes

- Surged faradism is extremely effective in the treatment of osteoarthritis Not only does it strengthen atrophied muscles, but it aids the absorption of synovial effusions, produces considerable relief of pain and increases the range of movement

It must be clearly understood that faradism is not a substitute for active exercise Used in the earlier stages of rehabilitation it prepares the way for the full functional use of the part

The faradic current is also used in the diagnosis and treatment of peripheral nerve lesions

The Sinusoidal Current

The sinusoidal current is obtained from the normal alternating current mains supply, the current being rendered earth free and reduced to a suitable voltage by a step-down transformer It is an evenly alternating current providing 100 stimuli [illegible]

irritant effect is made use of to improve the circulation, treatment being given in the sinusoidal bath [illegible]

lymphatic oedema of the primary vascular type characterized by oedema of the ankles and usually affecting young females

ELECTRO-DIAGNOSIS OF NERVE LESIONS

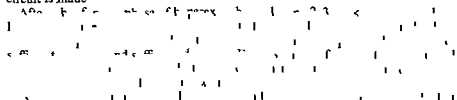
The reaction of degeneration

There is nothing mysterious about the reaction of degeneration its explanation is simple

A current passing steadily through the tissues does not stimulate muscle A contraction can only be initiated by the sudden ionic movement which occurs when a current rises from zero to maximum or falls back to zero and then only within definite time limits of $\frac{1}{10000}$–$\frac{1}{10}$ second

The faradic stimulus is brief lasting approximately $\frac{1}{1000}$ second In contrast the interrupted galvanic current is slow, taking $\frac{1}{10}$ second to rise from zero to maximum, or to fall back to zero

Normal muscle is stimulated through its nerve endings and responds with a brisk contraction to a stimulus lasting only $\frac{1}{10000}$ second It behaves in a similar manner when stimulated by faradism ($\frac{1}{1000}$ second) or interrupted galvanism ($\frac{1}{10}$ second) With normal muscle the contraction is strongest under the cathode when the circuit is made



this is largely of academic interest It is the failure of a muscle to respond to a stimulus of brief duration and the sluggish contraction which follows a slow

importance in diagnosis it is of less value as regards prognosis voluntary power usually returning before the response to faradism.

ELECTRICAL TREATMENT OF DENERVATED MUSCLE

The recent work of Professor Seddon has conclusively proved that electrical stimulation of denervated muscle is a measure of the greatest value (Seddon and Jackson 1945) Though interrupted galvanism in no way influences the rate of

ELECTRONIC VALVES

During World War II, apparatus employing electronic valves was evolved by Bauwens and by Ritchie (1948) for the diagnosis and treatment of peripheral nerve lesions

Extensive clinical trials have proved conclusively that muscle testing can be performed more simply and accurately with this apparatus than when the conventional technique, employing galvanism and faradism, is used Treatment is also simplified Several firms are already marketing similar equipment

A typical machine, the Ritchie-Sneath, has five "pulse" speeds, namely 0 01 millisecond, 0 1 millisecond and 1 millisecond (faradism), 10 milliseconds and 100 milliseconds (interrupted galvanism) The voltage of each pulse can be varied from 0 to 150 By noting the voltage each "pulse" requires to produce a minimal contraction, a graph can be plotted, from which it is possible to judge the extent and type of the lesion The method is quicker and more accurate than when galvanism and faradism are employed, and used therapeutically the current produced [illegible]

ACTINOTHERAPY

[illegible]

ultra-violet lamp was the natural outcome of this discovery.

When first introduced artificial sunlight was hailed by surgeon and physician alike as a therapeutic agent of the greatest value The extraordinary results obtained by Finsen (1901) and Gauvain (1926) in the treatment of lupus vulgaris and surgical tuberculosis were responsible for much early enthusiasm Gauvain always insisted that treatment by ultra-violet irradiation formed a part of the scheme of treatment and not the sole treatment This advice has been lost sight of in recent years and is one reason why actinotherapy has not entirely lived up to its original promise

Few synthetic agents are always as effective as the natural article, and as a substitute for the sun ultra-violet light is no exception Used intelligently, however, it remains a therapeutic agent of great value This necessitates an elementary understanding of the physics and physiology involved

Natural sunlight has an ultra-violet spectrum extending from 3,900 A to 2,900 A The ultra-violet spectrum forms 7 per cent of the sun's rays Visible light is responsible for 13 per cent and infra-red rays for 80 per cent Sources of ultra-violet rays commonly used in actinotherapy do not give off spectra entirely resembling the solar spectrum Though the carbon-arc lamp with carbon cored carbons has characteristics very similar to the sun that is infra-red rays 85 per cent, visible light 10 per cent and ultra-violet rays (3,900 A -2,900 A) 5 per cent, the output of the mercury-vapour lamp is totally different. This latter lamp produces 28 per cent of ultra-violet rays (3,900 A -1,849 A), 20 per cent of visible light, the spectrum being deficient in red and orange, and 52 per cent of infra-red rays

EFFECTS OF ULTRA-VIOLET RAYS ON THE SKIN

Erythema

Rays with a wave-length varying from 3,100 A to 2,500 A when absorbed by the skin cause destruction of cells with the production of a histamine like substance. This "H" substance is responsible for the erythema which develops after exposure to ultra-violet rays, and which is followed by desquamation Over-exposure will cause oedema, blistering or actual destruction of the superficial layers of the skin

Pigmentation

Rays between 3 300 A and 2,900 A are absorbed in the epidermis and produce pigmentation It is considered that patients who tan readily respond better to ultra violet therapy than do those in whom tanning is slight or absent

Vitamin D_3

Rays between 3,100 A and 2,700 A have a chemical effect on 7-dehydrocholesterol (a sterol found in the skin) converting it into vitamin D_3

Abiotic effects

Rays below 2,900 A are stated to kill bacteria on the skin They also destroy granulation tissue

THE BENEFICIAL RESULTS OF ULTRA-VIOLET IRRADIATION

Many beneficial effects, both general and local, are claimed to follow irradiation with ultra violet rays It is only proposed to include those which can be substantiated clinically

General

(1) By increasing vitamin D_3 formation the absorption of calcium and phosphorus is facilitated Ultra violet rays are therefore of value in the treatment of conditions characterized by calcium deficiency

(2) The resistance of the body to infection is increased

Local

(1) Used locally, ultra-violet rays increase the resistance of the skin to infection

(2) The growth of epidermic cells is stimulated

(3) It is of value for the treatment of certain skin diseases, including lupus vulgaris

(4) It is of value for the treatment of septic skin conditions and indolent ulcers

(5) It may be used as a local counter irritant for painful conditions of muscles and joints

(6) It is an effective form of treatment for tuberculous adenitis and certain types of surgical tuberculosis

TYPES OF LAMP IN USE

The practitioner has the choice of two types of lamp, the carbon arc lamp which produces a spectrum very similar to the sun, and the mercury vapour lamp which gives off a rich supply of the erythema-producing rays

Although it would appear rational to use a lamp with a spectrum similar to the solar spectrum when a substitute for sunlight is called for, there are a number of conditions in which the mercury-vapour lamp is preferable As regards running costs the mercury-vapour lamp is the cheaper lamp With a current consumption of 550 watts it produces a first-degree erythema in 60 seconds at a distance of

Measurement of dosage

Dosage is measured by the degree of erythema produced Four degrees of erythema are usually described

First degree —Slight reddening of the skin, coming on 6–8 hours after irradiation, which fades within 24 hours and is not followed by peeling

Second degree —Marked reddening accompanied by slight irritation, which lasts several days and is followed by slight peeling

Third degree —The skin becomes very red, hot and oedematous, irritation is intense, the erythema lasts for a week or more and is followed by coarse peeling

Fourth degree —The erythema is accompanied by an intense inflammatory reaction and blister formation With a third or fourth degree erythema there is marked vasodilatation of the superficial capillaries accompanied by considerable inflammatory exudate together with migration of leucocytes into the tissue spaces

Test dosage —Prior to the first treatment a test is performed to find the necessary length of exposure to produce a first-degree erythema The required dose can be calculated from this A sub-erythema dose is taken as being three-quarters of the time taken to produce a first-degree erythema.

General considerations

The production of an erythema, of vitamin D_3 and of pigmentation are three entirely separate processes, which can occur independently of each other Thus sub-erythema doses of ultra-violet rays, while increasing the formation of vitamin D_3, may or may not cause pigmentation Likewise, especially in the case of blonds, erythema is not always followed by pigmentation

GENERAL IRRADIATION

Two techniques are employed, depending on the condition and on the effects it is hoped to produce

Sub-erythema technique

If the patient is seriously debilitated it is unwise to produce an erythema all over the body, as this would be comparable to histamine shock Moreover, if the aim of ... health through the increased production of vitamin D_3, it ... erythema Thus ... osis or following ... course of sub-

the skin acquires a toleration to the ultra violet rays the length of each successive exposure is increased by 20 per cent

Rise in temperature or increased malaise indicates an unsatisfactory response to the treatment

Sectional technique

It is claimed that ultra violet rays increase the resistance of the body to infection There is some experimental evidence that this may be true and clinical results

for some hours He insisted that a definite erythema reaction was necessary to produce this effect that no more than one quarter of the surface area of the body should be irradiated at one time and that no area should receive a second irradia t on until 10 days had elapsed

More recently Menkin (1943) has demonstrated that inflammatory exudates in man contain protein constituents which influence white cell format on He isolated a pseudoglobulin which stimulates white-cell production and an euglobulin (necrosin) which has the reverse effect and causes leucopenia

exposure to ultra violet rays frequently results in a negative phase Whitby points out that over-exposure to ultra violet rays causes a lymphocytosis (Whitby and Britton 1946) These facts form the basis of the sectional technique which is em ployed for increasing the resistance of the body to infection the mercury vapour

in septic cond tions especially when the white cell count s low

LOCAL IRRADIATION

The value of local ultra violet irradiation is not in dispute the beneficial effects which it is claimed follow its use are all well proven But whereas in general irrad a tion sub erythema or first degree doses are employed when ultra violet rays are used locally second third or even double fourth degree doses are the rule

For local treatments the mercury vapour lamp air or water cooled is chosen on account of its conven ence and efficiency It has a rich output of the erythema producing rays and it is chiefly through their action that the beneficial effects are obtained The inflammatory reaction which occurs in association with a second or

cond tions such as acne vulgaris and psoriasis

The water cooled Kromayer lamp was used for local treatment, repeated blister doses (double fourth degree) being given under compression with the object of causing an intense inflammatory reaction and destroying the lupus vulgaris There is some evidence that the ideal treatment for lupus vulgaris may ultimately prove to be a combination of calciferol and actinotherapy

Chronic ulcers, indolent wounds, bedsores and sinuses all respond satisfactorily to local irradiation To start with, repeated fourth degree doses are given with the object of cleaning up and stimulating the condition, the Kromayer lamp being used for this purpose, either in contact or at a distance of 2–4 inches For the treatment of sinuses a quartz rod applicator is employed After the slough has separated and the base of the ulcer is covered with healthy granulations, second degree erythema doses are employed with the lamp at a distance of 2 feet, to encourage epithelization At this distance the short abiotic rays are absorbed by air

As a counter-irritant for the treatment of painful conditions such as tennis elbow or subacromial bursitis, local third degree reactions using the Kromayer lamp are sometimes effective The irradiated area should be covered with Elastoplast immediately after treatment

This incomplete list of conditions suitable for treatment by local ultra violet irradiation gives some idea of its scope If technique is accurate, results are good

HYDROTHERAPY AND SPA TREATMENT

The ter [illegible]
ternally [illegible]
form of [illegible]
practised at the spas, and in the rheumatic clinics of the British Red Cross Society

Though hydrotherapy has its chief field in the treatment of the chronic rheumatic diseases, it is of equal value in the rehabilitation of post traumatic and other [illegible] muscles Hydro- [illegible] out, and

Treatment is given by bath douche or spray, combined when necessary with massage, movements or manipulation, after which the patient usually rests for 30 minutes in a blanket pack

BATHS

Baths may take the form of arm or leg baths, immersion baths, or the deep pool

Hot baths

These relieve muscle spasm and promote sweating They may be given in the full length immersion bath, the vapour bath or hot air cabinet

The deep immersion pool

The deep immersion pool, with water at a suitable temperature, is invaluable in the treatment of chronic joint conditions poliomyelitis and spastic paralysis

The warmth of the water aids relaxation and the buoyancy of the water facilitates the movement of the affected limbs Brine baths with their increased buoyancy may be still more effective

Whirlpool baths

[illegible]

Foam baths

These, by preventing the radiation of heat from the surface of the body induce copious sweating They are used in gouty conditions and in the treatment of obesity

Contrast baths

Contrast baths are sometimes employed to improve the circulation in the lower extremities The legs are first immersed in water at 106° F where they remain for 3 minutes before being transferred to water at a temperature of 60° F for one minute the process being repeated 6–8 times

Carbon dioxide baths

This type of bath is sometimes of use in the treatment of chronic heart disease The free carbonic gas settles in myriads of little bubbles on the skin immersed in the water and these coalescing into larger bubbles stimulate the superficial blood vessels improve the circulation and cause a fall in blood pressure This type of treatment has its origin in Bad Nauheim where the natural waters contain carbon dioxide and on account of the effervescence of carbon dioxide the baths can be [illegible]

[illegible]

cient sodium bicarbonate and acid sodium sulphate are added to produce efferves cence A course consists of 20–30 baths given on alternate days, the first bath lasting 5 minutes and the duration being progressively increased to a maximum of 12 minutes The temperature of the first bath is 95° F, subsequent bath tem peratures being gradually lowered to a limit of 80° F

The pulse rate should be carefully noted before and after the bath In suitable cases, following the bath the patient performs a series of light exercises

DOUCHES AND SPRAYS

A douche may be defined as a single jet of water delivered under considerable pressure a spray as multiple fine columns of water

Douches

[illegible]

local, lasts for 10 minutes and ends with the cold jet, the patient subsequently resting for 30 minutes in a blanket pack The Scotch douche is used as a stimulus to the peripheral circulation and in the treatment of muscular rheumatism

Douche massage (Aix douche)—The hydrotherapist directs a stream of water at a temperature of 102° F on to the part under treatment, at the same time thoroughly massaging the part The massage douche produces relaxation of the tissues, making both active and passive movements easier. It is a valuable treatment for fibrositis, panniculitis, and painful joints

The under-water douche—This is given with the patient reclining in a warm immersion bath, while a jet of water at a higher temperature, and delivered under water, plays upon the affected part The under-water douche is employed in the treatment of fibrositis

Sprays

These may take the form of a shower bath, or the needle bath in which the direction of the spray is horizontal

The needle bath—A needle bath may be given at a low temperature for its stimulating effect following a hot bath, or at neutral temperature as a prelude to some other form of treatment

Spray massage (Vichy douche)

put through their full range of movement Treatment ends with a strong douche applied back and front at a gradually diminishing temperature, after which the patient rests for half an hour in a blanket pack It is indicated in the treatment of non-articular rheumatism

Spa Treatment

A spa may be described as a health resort possessing natural mineral waters, which are of therapeutic value both when taken internally and when used externally

Many of the hydrological methods, already described, are in regular use at the spas In ... as hydro-
therapy
change c
the regularized diet, together with the aperient or diuretic effect of the waters
... make the treatment more efficacious than

lassified as
simple thermal, saline, sulphur, chalybeate (iron) and bromo-iodine Though the
... ld be well advised to consult a

h and Buxton
and the brine waters of Droitwich are mainly employed for bathing purposes, especially in the under-water treatment of stiff joints and non-articular rheumatism

The waters of Cheltenham (muriated sulphated and muriated alkaline) are taken internally for metabolic and gastric disorders

Harrogate offers considerable variety, having saline sulphur springs whose waters are aperient alkaline sulphur springs which are used for bathing purposes and chalybeate springs

Bromo iodine waters are found only at Woodhall spa and are of value in the treatment of arthritis in association with the climacteric or chronic pelvic inflammation

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PSYCHIATRY

PHYSICAL METHODS OF TREATMENT IN PSYCHIATRY

INTRODUCTION

Forms of mental illness constitute some of the most difficult problems with which the family physician is confronted There is no lack in the diversity of symptoms presented These symptoms represent a failure on the part of the patient to make a satisfactory adaptation to life, to his environment or to the other members of his social group Varieties of these illnesses have been recognized from time immemorial, and the attitude adopted towards them has varied according to the current beliefs as to their causation Historians trace references to the time of the ancient Greeks, at which period the treatment was in the hands of the physician Hippocrates believed that the brain was the seat of the mind, and that mental illnesses originated from natural causes similar to any other illness At a later period, those suffering from mental illness came to be regarded as bewitched or possessed of evil spirits, and their treatment passed into the hands of religious bodies We find that the first hospital in England for the care of the mentally disordered dates back to the beginning of the fifteenth century Such treatment as [illegible]

within the walls of their hospitals and, inevitably, there developed a cleavage between psychiatrists in their special field, and physicians dealing with general medical problems Fortunately this attitude has undergone a radical change [illegible] with the advanced stages of [illegible] ing with such patients in the [illegible] roup of minor disorders, the psychoneuroses The introduction of psychiatric units into general hospitals has helped to remove the old belief that there was a dividing line between general medicine and psychiatry The relationship between body and mind cannot be ignored, and it is generally accepted that there is no form of mental illness in the causation of which physical disease may not play an important part

AETIOLOGY OF MENTAL DISORDERS

[illegible] involved in the production of those [illegible] These may involve [illegible] and the [illegible]

result of any one alone Similar factors may operate, to a lesser degree, [illegible] illnesses, and everyone has witnessed how a failure to recognize and treat them has influenced the duration of symptoms. It seems advisable therefore, at this stage to review briefly these aetiological factors before the specific forms of treatment are discussed

Constitution and Environment

The effects of constitution and environment are not readily separated, their *influence varies according to the balance of the other factors, and may vary* at different periods in the patient's life history The incidence of mental illness in different members of the same family has drawn attention to the influence of heredity and constitution, and research studies of such families, especially studies of twins, have confirmed the importance of these Only in exceptional instances, however, as in Huntington's chorea, are inherited predispositions independent of environment How frequently a patient is seen, with a strong inherited disposition to melancholia, who remains well, until a domestic crisis supervenes to upset the balance

Personality and Physical Types

This transmissible tendency is shown more frequently in a special type of personality Thus we have come to speak of schizoid syntonic, obsessional, hysterical and paranoid types These invariably show the essential features of certain forms of mental illness, and in some the similarity is so great that the demarcation line between the normal and the actual illness may not be easily defined, yet many with such types of personality never become ill In general, however, the more pronounced the variation of the personality from normal the greater the risk of illness in times of stress Certain bodily characteristics appear to be associated with a particular mental constitution Kretschmer has described the 'pyknic" group as short, well covered people with thick necks, in contrast to the viscerop-

type and schizophrenic illnesses While these facts are of considerable interest, it should be emphasized that there are frequent exceptions, and their practical value

Psychotic illnesses are rare before adolescence, when physiological changes become more marked Conflicts between instinctive desires and social standards then become more active and demand fresh adaptations At this age the incidence is relatively high and remains so for some years Similarly there is an exacerbation

personality

Physical Factors

Apart from toxic infective conditions, physical factors in themselves are rarely direct causes of mental illness Exceptions are those disorders resulting from trauma which produce direct injury to the brain, and those due to vascular changes,

generally of an arteriosclerotic nature It has not been found possible to correlate mental symptoms with damage to special areas of the brain *While total disability* from head injury is rare, residual symptoms are not uncommon, and they are of more serious significance in those whose employment requires a higher degree of *intellectual ability Acute general infections may give rise to delirium followed* as in the case of influenza, by lassitude and depression Such an illness may also release other symptoms of a schizoid or syntonic nature, depending on the personality and make up of the individual Divergent views exist as to the role of focal sepsis and the frequency with which it is reponsible for the development of mental symptoms The frequency with which it is the only or the main cause is small, and in such circumstances the focus must be dealt with by surgical means Unless there is clinical evidence of toxaemia, surgical intervention in the mentally sick is not *likely to be more beneficial than it would be in the mentally healthy The role of* alcohol in the production of mental diseases is limited, the acute alcoholic psychosis and Korsakoff's psychosis are the direct results of alcohol A detailed investigation of the history and personality of the individual will generally show *chronic indulgence in alcohol to be symptomatic rather than causative of a mental* illness

CLASSIFICATION OF PSYCHOSES

... a sense of ... is ... y *for statistical purposes—but the elaboration of disease entities is unsatisfactory* because of the complex nature of the problem We have achieved little when we fit a mental illness into a diagnostic compartment, we shall be able to assist the patient more if we determine how and why he reached his present state, and if our diagnosis is coupled with an appreciation of the personality and its evolution Meyer was one of the first to draw attention to the fact that we are dealing with individual reactions rather than disease entities This reaction, as we have seen may be influenced predominantly in some by the constitutional or the environmental *factors, and in others by psychological factors* More frequently there are various degrees of relative interaction of all of these factors

So it is that we prefer now to think in terms of syndromes or reaction types which *although showing individual variation, retain certain broad patterns, it* follows that certain symptoms may be common to several types of mental illness It is not ... to give a detailed description of all types ... ractice and ... following affective syndromes, including mania depression and ... elancholia, schizophrenia (paraphrenia, paranoia), and organic syndromes

AFFECTIVE SYNDROMES

Depressive states

Depressive states constitute the most frequent psychiatric problem in general *practice It must be remembered* that there are all degrees of variation in the affective state In the mildest forms t... features are a lack of

interest, loss of feeling inability to concentrate as before, and a dulling of the mental processes It may be that such symptoms are in the earliest stages entirely subjective in nature The picture may be complicated by the development of various neurasthenic ill defined aches and pains Physical examination reveals nothing to account for such symptoms and a few anxiety signs may be all that is apparent Such patients tend to display little desire to employ themselves, and become more engrossed in their own distress More advanced stages are characterized by a greater degree of psychomotor retardation, and delusional ideas of a self reproachful nature To confirm the diagnosis, inquiry should always be made as to the previous personality Not infrequently the condition is part of a manic-depressive reaction but the depression does not necessarily alternate with a phase of elation The elated stage may not have been noticeable to the friends, but closer inquiry may elicit the information that between times the patients are full of life and

patients make a complete and satisfactory recovery from such an attack. The great danger is that of suicide, and they form a large proportion of the numerous deaths by suicide each year This, in some cases, is deliberately contemplated and planned for some time previously In such circumstances it is more readily prevented As a rule, however such attempts are the result of a sudden impulse, and so are extremely difficult to prevent Admission to hospital should only be recommended when there are inadequate facilities to deal with this aspect at home

Mania

The classical features of mania are overactivity, elation and a feeling of well being rapid flow of speech with flight of ideas Delusions, if present, are of a grandiose nature and there may be varying degrees of aggression

Agitated melancholia

Agitated melancholia develops invariably for the first time around the meno-

of illness persist for any length of time, and the degree of danger to life, in untreated cases is not adequately appreciated by most physicians

Schizophrenia

This term is now used to replace the term dementia praecox The latter implied a disease of adolescence with dementia as a prominent feature, and consequently an extremely grave prognosis Observation has shown that this concept must be modified The condition is not limited to that particular age-period and many patients show improvement, especially if the onset is sudden and there is an adequate causation When, however, the condition has remained undiagnosed until later in life,

earlier age

tion Such

news that would previously have caused sorrow they will now find cause for laughter They become indifferent, and gradually lose touch with reality The most

one process

Simple hebephrenic type

The clinical picture may remain, as already described, for a long period Gradually the patient becomes more autistic and inaccessible Hallucinatory experiences may give rise to behaviour difficulties, and there is gross disintegration of the personality

Catatonic type

The catatonic type is usually more acute in onset, and is characterized by phases of stupor, and of excitement The prognosis is more favourable in this variety than in any of the others Successive attacks invariably lead to deterioration

Paranoid type

The paranoid type paraphrenia, tends to develop at a later age—in the thirties Unsystematized paranoid delusional ideas are the conspicuous features with

in a personality otherwise well preserved The outcome is invariably unfavourable

ORGANIC SYNDROMES

In organic syndromes there is a reduction in mental capacity with varying degrees of confusion amounting in certain cases, to delirium Hallucinations both auditory and visual are common often of a terrifying nature, and the clinical picture may simulate that seen in certain states of excitement and catatonic conditions the cause of the illness being the distinguishing feature There is emotional instability, memory impairment—that for recent events being lost early—and *dementia may result*

METHODS OF TREATMENT

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not
sical
methods we generally mean treatment by (a) prolonged narcosis (b) co ons,

(c) electronarcosis, (d) insulin, and (e) prefrontal leucotomy operation Each of these carries definite risks to the patient and, in general terms the degree of risk of each is in the order given

PROLONGED NARCOSIS

This method of treatment has been practised in different forms since the beginning of the present century At first it was employed in the treatment of states of excitement Additional experience has demonstrated its value in the treatment of such symptoms as acute anxiety, severe depression, terrifying hallucinations and incessant activity leading to exhaustion, and the risk of intercurrent infections.

[illegible]

drachms by mouth, or by rectum, every 6 hours, if required

The aim of treatment is to maintain each day at least 16–20 hours of sleep, from which the patient may be roused at intervals for food and nursing attention. Obviously, nursing care is of the utmost importance and, apart from the usual [illegible] sleep, various precautions must be observed. The [illegible] and reten- [illegible] nd respira- [illegible] signal A

[illegible]

maintained for 1–3 weeks It is exceedingly important to withdraw the drugs gradually at the termination of treatment, otherwise convulsions may develop, as a rule these are transient.

[illegible]

and in suitable cases, it is a valuable therapeutic method Not infrequently the patient shows considerable improvement after treatment, but this improvement may prove to be short lived, and after a few days the symptoms may be as pronounced as ever In such cases further improvement is unlikely from a second course of treatment, and consideration should be given to one of the other physical methods

CONVULSION THERAPY

Cardiazol

Convulsion therapy was introduced initially on the assumption that there was an antagonism between epilepsy and schizophrenia, particularly the catatonic [illegible]

injection, then the dose was at once repeated These injections were repeated every three days, the total number of treatments being dependent on the response of the patient There were two marked disadvantages The chief was a marked feeling of acute anxiety and fear, experienced by the patient, between the giving of the injection and the loss of consciousness Thrombosis of the veins at the site of *injection was another practical difficulty, and because of this it often became* difficult to complete a course of treatment

Electro convulsion therapy

In 1937, Cerletti and Bini described a method of inducing convulsions by elec [illegible]

apparatus and the technique is quite simple, the current of electricity being passed through two electrodes placed on the forehead

Although convulsion therapy was introduced in the treatment of schizophrenia [illegible]

cases its use is mainly symptomatic, and a weekly maintenance dose is beneficial Its greatest value is in the treatment of affective disorders, in which it is almost specific This applies to both manic depressive psychosis and involutional melancholia It is an interesting fact, not yet adequately explained, that whereas the treatment relieves the depressive phase it also controls the other extreme, namely excitement Treatment is generally given twice a week, but it may be employed much more frequently, depending on the type of illness Several convulsions may be given each day, for a few days, in cases of acute excitement, and in acute agitated depression These produce varying degrees of confusion from which the patient often emerges dramatically improved In general, 6–10 treatments suffice in the treatment of depressive illness, but relapses sometimes occur While one can

usually undertake to clear a depressive illness by this method of treatment one cannot guarantee that the patient will remain well after the treatment is discontinued and a further course may be necessary

Complications

The chief complications are the result of injury from muscular spasm Fractures of the body of the vertebrae occur due to compression They give rise to few symptoms are not followed by serious sequelae and are much less serious than was at first feared Occasionally fractures of the long bones result and must be treated in the usual way Varying degrees of amnesia from an inability to recall names (seen in the majority of patients) to a Korsakoff like picture develop during treatment and may persist for some weeks thereafter They invariably clear up completely Pulmonary complications may be serious and there is evidence to suggest that the method may activate latent and quiescent tuberculosis The presence of severe cardiovascular complications with or without hyperpiesis requires careful consideration and investigation

Curare

It has been found that with the use of curare the scope of treatment is enormously increased since it is possible to obtain the therapeutic effect without the severe muscular contractions Within the range of convulsion therapy can now be included old and feeble patients those with spinal deformities and certain types of cardiovascular disability Obviously an additional risk is added so that the method is generally reserved for those with some physical disability

An oral airway is passed and the patient is insufflated with oxygen The convuls on is then induced and the oxygen insufflation continued with a respirator until breath ng is resumed Untoward effects are only rarely experienced and Prostigmin is then the antidote to be employed As a rule recovery from the curare is complete in 10–25 minutes

ELECTRONARCOSIS

Electronarcosis may be described as a modification of convulsion therapy A special apparatus is necessary which provides a constant electrical current of lower potential than that for convulsion therapy Instead of giving a sudden violent stimulus to the brain for a fraction of a second the current of lower potential is

duces strong flexion at the elbows and a certain degree of respiratory stridor This is maintained for about seven minutes The treatment may be given 3 or 4 times a

week, a course consisting of 12 treatments A rest of several days is advocated, and a further course of 6–12 treatments may be given

The dose varies from patient to patient and must be regulated by experience If the dose is not adequate the patient may become conscious during treatment and the experience is rather terrifying A thorough physical examination is necessary, with particular emphasis on the circulatory and respiratory systems, and an electrocardiogram should be taken of each patient before treatment The blood pressure must be closely watched, and may rise very appreciably during treatment A rise in the diastolic pressure above 130 millimetres and signs of respiratory or cardiac embarrassment call for immediate termination of the treatment The degree of memory impairment is said to be less than that seen as the result of convulsion therapy Curare may be employed as with convulsion therapy to minimize the risk of fracture Its use, however, does not appear to influence the increase in blood pressure

more chronic schizophrenics has to be observed over a longer period of time It would not appear to be more beneficial than convulsion therapy in the treatment of depressive illnesses, particularly if there is any suggestion of hyperpiesia or other cardiovascular disease.

INSULIN TREATMENT

Apart from its use in diabetes mellitus, insulin has been used in small doses to improve the appetite and the general physical health In moderate doses it has proved useful in allaying the restlessness and excitement seen in certain alcoholic

that greater benefit to the patient may accrue from the regular administration of the treatment by one experienced physician Considerable skill is required in obtaining such degrees of coma as the clinical condition warrants It is desired that the stage of coma be reached about three hours after injection, if the dose is excessive, danger signs may appear before coma has been maintained for an adequate period The do ... the reaction to treatment on the pre ... lation is readily apparent ... units of insulin given intramuscularly For convenience it is generally given about 7 30 a m , so that treatment may be completed within four hours, and in time to allow the patient to have lunch at

1,000 units Another feature of great significance is that a patient may ... increasingly sensitive to insulin, and react more severely to the dose previously determined as that necessary to produce coma

It has been found that a severe coma tends to create an increased susceptibility the following day. Increasing depths of coma increase the risk of producing an irreversible coma If the coma is prolonged in the third and fourth hours then tonic spasms develop, to be followed by other neurological complications The pupils are dilated, fail to react, and the corneal reflex is lost The pulse rate falls and cyanosis develops. The coma is terminated by the administration by nasal feed of 500 millilitres of 33 per cent warm sugar tea Normally the patient wakes in a matter of a few minutes, and additional food is given Lunch should follow within an hour If the patient does not wake up within 20–30 minutes, an intravenous injection of 40 millilitres of 33 per cent glucose is given Occasionally this is ineffective, and further intravenous injections of glucose, together with a saline drip, lumbar puncture, Coramine, adrenaline, and blood transfusions may be necessary Recovery from this prolonged coma usually occurs within 24 hours, but occasionally the coma may persist up to 5 or 6 days After prolonged periods of unconsciousness an impairment of the intellectual functions is sometimes seen and may be permanent. To recapitulate, the main danger-signs during treatment are a variation in the pulse rate, below 40 or above 120 per minute, signs of circulatory collapse, the early development of coma or the development of epileptic fits, vomiting, spasm of the larynx and extensor spasms of the arms and legs

It is important that the patient should remain under observation during the

routine activities, but it is preferable that they should not expend too much physical energy

Results of treatment—Patients may gain in weight as much as 2–3 stones, much of which is readily lost after treatment is completed This gain in weight is

coma This may occur even after a few comas, and the period of improvement gradually extends It is impossible to forecast when improvement will be obtained Some appear well after 10–20 comas, others not until much later. If, however, the physical condition has improved, and there is no apparent clinical improvement in the mental picture by the time the patient has had 30 comas, then the outlook for recovery is generally poor The maximum number of comas given is 60, but generally 40–50 are adequate, and it is not unusual for improvement to continue after treatment has been terminated

Convulsion therapy with insulin

It has been noted that certain patients have shown a greater degree of improvement after the onset of fits during deep coma and by modification of the technique an experienced clinician can induce a basal fit if so desired The degree of risk is diminished, however if the convulsion is produced either by Cardiazol or electrically induced Opinions differ as to which of these two methods is more efficacious and it is not certain that either method holds any material advantage over the other The convulsion is induced usually at the end of the sopor stage or at the beginning of the coma, which is then immediately terminated by intravenous glucose Six to ten convulsions may be given during the period of insulin treatment dependent upon the response of the patient The method has been more successful in the catatonic variety, in which there is apathy, 'negativism" and refusal of food It is employed only in those patients who have failed to respond to insulin alone

Modified insulin therapy

This technique has been found of great value in certain psychoneurotic and psychotic conditions generally associated with poor physique It may be employed in depressive illness after convulsion therapy, and it has proved beneficial in post concussiona lstates It is of limited or no value in florid schizophrenic illnesses and in depressive states it must be regarded only as an adjuvant to convulsion therapy

The dose of insulin employed—generally between 30 and 90 units—is such that the patient does not pass into coma He should be able to swallow fluids 2½ hours after injection of the insulin, and if the degree of sopor passes beyond this the treatment is immediately terminated A well trained staff will readily recognize when this is probable, and sugared tea, as before, must be given Should it be necessary, a reduction of 10–15 units of insulin would be made the following morning The great advantages of this method are that it is much safer, many more patients can be treated at one time, and the presence of a doctor is not required throughout There is, in general, a marked gain in weight with a concomitant feeling of well being Occupational, recreational, and psychotherapeutic measures must be employed to achieve the maximum benefit

CONCLUSIONS

Hypoglycaemic treatment is the one of choice for schizophrenia As in all other forms of treatment, the chances of success diminish with length of symptoms The acute schizophrenic comes under treatment at a relatively early stage and, in general those treated within six months of onset do well Other favourable factors are (a) a definite external precipitating cause, (b) a pyknic build as opposed to the asthenic, (c) a cyclothothymic temperament, and (d) a history of previous remissions Of acute cases it has been found that the paranoid and the catatonic offer a better prognosis than the simple hebephrenic, in whom the outlook is poor The treatment is accompanied by definite risks, which must be appreciated before embarking on it Team work is of the greatest value, and obviously the method should be employed only in hospitals or nursing homes with an adequate and
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patic

PREFRONTAL LEUCOTOMY

Experimental and operative work on the frontal lobes have demonstrated the need for a revision of earlier views on their functions These were classified and localized, and so one was taught to think of centres which governed movement, and centres which governed sensation, and that functions were localized to certain areas This view has proved to be much too circumscribed, and it has been demonstrated that the recuperative powers of the nervous system are much greater than

nucleus acts as a relay station for impulses from that area In the operation of prefrontal leucotomy these connexions are interrupted either by removing an area of the cortex or by severing the connecting fibres More recently, a technique has been devised in America to produce circumscribed lesions in the dorso-medial nucleus itself

The operation to sever the fibres connecting the prefrontal area of the cortex with the thalamus was first performed by Moniz and Lima in Portugal in 1936 Various modifications of technique have been elaborated, so that rarely do two neurosurgeons appear to employ the same method The earlier method employed in Great Britain was to open the skull by a 1-centimetre burr-hole, 5–6 centimetres

matter The instrument is inserted in front of the anterior horn of the lateral ventricle, and the more posteriorly the cut is made the greater the number of fibres severed, and the greater is the subsequent change in personality In total operations the white matter is cut above and below the point of entry of the instrument A modification has been made in cases in which it is desired to avoid any marked personality changes, and this is accomplished by making the incision only below the point of entry The great drawback is that the surgeon cannot see what he is cutting and any damage to blood vessels is not easily controlled More recently an open operation has been performed, and by selective undercutting an equally large number of fibres may be severed without producing the same degree of personality change Bleeding, if it occurs, can be readily controlled This is, at the moment, the method of choice in depressive and obsessional forms of illness, but whether or not it will prove to be adequate in schizophrenia has yet to be proved

Tension is the chief symptom relieved by this operative procedure, and in general terms the greater the degree of tension the more likely is one to obtain benefit Schizophrenics who show a marked poverty of affect seldom show any material benefit from operation Other types who show more marked fluctuations show a greater degree of response Apart from recovery, many of the more chronic patients

content The care of these patients ceases *to be the problem it* formerly was, and they are able to enjoy the amenities of hospital life

As would be anticipated, depressive illnesses are benefited to a much greater degree, especially *long standing involutional types* They are invariably much helped by convulsive therapy, but relapse soon after this treatment is completed The problem with regard to the manic-depressive group has not as yet been solved Operation has benefited *some, but others continue to show the same variation in* their mood swings, and further research on this group is needed

The results obtained in many cases of obsessional neurosis have been most dramatic Patients who have been handicapped for many years by compulsive phenomena, with considerable tension and anxiety, have responded very well Here again it appears to be the tension and anxiety that is relieved rather than the *compulsive phenomena The group of psychopathic personalities appears to gain* little from operation In certain cases it has removed any sense of guilt that existed, without effecting any fundamental change in personality

The greatest problem that confronts us is to decide when the operation should be performed Being, as it is, a destructive process, it should be regarded, in the writer's opinion, as the final line of attack If the physical health of the patient *permits it then all other relevant forms of treatment should be given first* A valuable prognostic guide can be achieved as to the probable benefit from operation This is likely to be greater if other forms of treatment have met with success, even though *this success be only of a temporary nature If no benefit has been achieved by the* other methods discussed, then little benefit is likely to be obtained from operation

After-care and complications

The after-care is the same as that for other neurosurgical operations, and the infrequency of immediate post operative complications is surprising The mortality *rate is about 3 per cent, the chief cause of which is haemorrhage,* either immediate or delayed Incontinence of urine occurs with comparative frequency and may [illegible] abnormal

[illegible]

regarding the future has gone and there may be a lack of self-criticism, [illegible] satisfaction in the present The degree of intellectual impairment is small, but lack of initiative and drive have been frequently seen There is no doubt that many of these changes are related to the site of cut at operation—the more posterior the incision the greater the degree of damage Many patients submitted to operation have been ill for a number of years, and some of the change in personality referred to may be attributed to this

Thus far, it has not been possible to relieve the patient's symptoms by operation except at the expense of varying degrees of personality change It is conceivable that, with greater knowledge and experience of the pathways that should be interrupted, an operative technique will be devised that will leave no *impairment* Until that is achieved it follows that much of the success of operation and, *in fact*, of all methods of treatment that have been described, will be dependent on the measures adopted towards the rehabilitation of the patient *Everything* must be

done by psychotherapeutic, recreational, and occupational means to develop new habits and to effect successful readjustments Invariably, constant stimulation and reassurance is necessary in the early stages, and regular employment must be insisted upon Early discharge from hospital has been recommended, but so much depends on the nature of the primary illness and on the facilities in hospital for re-education and rehabilitation, that one cannot generalize in this matter

SUMMARY

Whatever may be the final judgment on the physical methods of treatment which have been discussed, there is no doubt that they have created a considerable stimulus to psychiatric endeavour The duration of illness has been shortened, and there

the final rehabilitation of the patient

THOS TENNENT

PSYCHONEUROSIS

PSYCHONEUROSES AND OTHER DISORDERS OF THE PERSONALITY

Psychotherapy covers all forms of healing which have as their object the recovery of the patient by mental means In so far as all conditions of body and mind implicate the total personality of the sufferer, some measure of psychological aid is to be found in any influence which improves the well-being of a patient Whether he realizes it or not, the good physician with his bedside manner radiates good will, and in his support in times of stress, his optimism, and his taking the patient into his confidence, he is having an influence over the patient's mind producing health giving reverberations in the body of the sick person

The atmosphere of recovery in a hospital ward or in the home, the skill and kindness of the nurse, the good sense and stability of the anxious family all work through the same mental channels which lead to recovery Nevertheless, what we today mean by psychotherapy are all the methods scientifically organized on the basis of our knowledge of the working of the human mind, and this means not only the relationships between various mental processes, but the known relationships of mind and body

Our growing knowledge of cortical functions, and of their relation with autonomic responses, gives us a scientific foundation for a belief in the close connexion between the emotions, the body's well being and the complex life of the mind and the behaviour that it implements

PSYCHOTHERAPEUTIC METHODS

Psychotherapy was at one time based upon empirical experience alone, and this was largely a function of the doctor who gathered his knowledge from years of observation and treatment Such theories as existed were based on scanty evidence, yet they were based on experience of a sort Today the theories have been enriched by wider experience not only of mental diseases, which we call psychoses, but from the close study of … The hypotheses which … lidity because they are fo… great length and checked up by the study of normal phenomena Moreover they are not out of accord with neurological concepts or with the study of emotional changes which occur in disorders of the endocrine autonomic systems

SUGGESTION

Some forms of psychotherapy use relatively circumscribed processes of the mind, … For example, suggestion implies … belief, decision or action by one … ind whether verbal or otherwise, without the use of rational argument

Hypnosis

bearing on the disability for which he is being treated

Special technique of hypnosis

In order to achieve this hypnotic state, the patient, sitting perfectly relaxed in a comfortable armchair, is asked to fix his gaze upon a shining object or even upon the eyes of the physician directed downwards upon the patient so that a degree of strain is placed upon the ocular muscles of the patient In slow monotonous voice the physician at the same time suggests the onset of fatigue of the eyes, of the limbs, and of the whole body With signs of flickering eyelids suggesting fatigue, the

then downwards upon the body, the patient shows signs of relaxation and the

response.

Once in this state, the doctor can suggest the dispelling of symptoms, such as paresis, sickness, or even pain, or he may go further and encourage the patient to speak of experiences which are believed to have been associated with the onset of the symptoms

Re-education

an obsessive idea or compulsion The moral aspect of this method lies in the "philosophy" adopted by the physician It is, of course, a method which cannot but be permeated by suggestion, persuasion and ideology

Analytical Methods

All methods which deserve the name of analytical are attempts to trace the un-

which we forget, and the reasons for forgetting, not remembering was largely not

the complex situations which have grown up as the *mind passes from childhood* to adult life

PSYCHOTHERAPEUTIC TREATMENT

The treatment of emotional disorders by psychological methods has no definable frontiers because no disorders of *a person are entirely free from mental accompani*ments, and, *vice versa*, no psychological cures are confined to mental methods *alone In the first* place, anxiety accompanies both acute and chronic illnesses of the body, and the mind is caught up in the apprehensions which spring from pain, fear of crippling, terror of death or fear of economic and social consequences No physician can abdicate the right and the duty to allay anxiety which militates against recovery in organic disease, to give sleep and to reduce pain and restlessness is no small *part in therapy, surgical and medical*

In the second place, however recondite psychological methods appear to us to be, and however necessary *it may be to correct maladjustments and solve mental* conflicts, the psychiatrist must frequently consider the use of sedatives when the patient is too restless or too emotionally disturbed to face the added stress of deep psychological methods of exploration

These two considerations are worth stressing at the outset because it helps to bring psychiatric method back into general medical art from which it is in danger of being divorced It is a necessary education to medical practitioners constantly to

ment, but by the sympathetic phenomena which form such a peculiar . . cerebral function and the body's metabolism and tonus Moreover, there are the frequent disturbances of autonomic function which are the only conscious *intimations to the patient* that all is not well with him

ANXIETY STATES

General Approach

The above is borne out by the study of anxiety states where the disorders are *diffused autonomic disturbances, not infrequently* paradoxical in their nature The mental undertones may be entirely unknown to the patient until history discloses the moment of the translation of an apprehension *into a physical* disturbance

. . . that psychiatry of our own time has made to

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s but in therapy
treatment of a neurotic

that the patient senses that he is being regarded as a person and not as the mere carrier or vehicle of a disease, that he is not so much the victim of a disorder, as

worries me"; "It comes over me", a sort of intimation that the distress is imposed from without, or better still, that it arises from within from some processes in the personality so far outside the field of awareness, but the influence of which is felt as suffering—as an imposition

diseased or disordered organs or systems As soon as possible, however, he must be made to see them in the light of his own life history, relating moments of experience, emotionally charged, to the onset of the particular symptoms of distress The most elementary exposition of the part the body plays in normal emotional states must be used, and as soon as possible, so that the patient can be induced to step over the threshold of the presenting symptoms to the narrating of the life events with which they are immediately related Before long the patient has embarked upon the story of his emotional life, and can be made to disregard his symptoms in the telling until the recrudescence of a critical incident in the story may suddenly bring back symptoms This is a moment never to be neglected—it is the occasion for realizing

remains unsolved, and indeed without the anchorage which the physical fear has, as it were, given him, he is prone to drift into deeper emotional waters The physi-

REDUCTIVE ANALYSIS

Nevertheless, many anxiety states spring from roots that lie more deeply embedded in the personality than the discussion of precipitating causes can wholly explain When this is the case, the patient will need a reductive analysis of his emotional life By the technique of free association, which will include the analysis

meanders back into the patient's home life Misplaced feelings are slowly detached

from their childhood bonds, and the patient is now increasingly free to see his present emotional stress in its true perspective

Reduction of the neurosis by analysis is best carried out with the patient in a position of relaxation in a comfortably deep armchair, or better still, reclining on a couch with the physician behind and at the side of the patient, outside direct line vision

Non-specific analysis

the rule he will find his mind roaming over a wider field in which time and place *seem to play a subsidiary role The patient's hesitations indicate the upsurge of* unpleasant thoughts, memories or fantasies, and as time goes on the threads turn backwards to earlier epochs of life With continuation the physician becomes more and more implicated as he stands for or reflects the personalities who have most influenced the patient's emotional development Love and hate relations are seen through him, until the doctor with insight gradually sees himself as a means whereby emotions felt towards, say, parent figures are transferred to him This is the transference situation which he learns to interpret back to the patient

Specific analysis

This is conducted wherever possible under the same conditions of relaxation, but instead of throwing the patient back into his past, leaving him at first to his own associative resources, the patient is directed to associate upon actual symptoms and their history, or he is encouraged to play freely round specific difficulties, such as *sex inhibitions, social relations, habits of thought and behaviour*

FULL PSYCHOANALYSIS

quate, and a full psychoanalytic régime will be called for In such a régime ... tion between doctor and patient becomes one of paramount importance In

is encouraged to refer to books dealing with the general principles of the technique and its difficulties In the special technique of Alfred Adler, the physician directs

Jung's approach is more philosophical inasmuch as he attempts to unearth the way in which the deeper trends and aspirations of the subject have been thwarted by a sharp conflict between conscious behaviour and the predestined patterns of the personality which lie in the unconscious, and which are themselves determined by the unconscious of the race

GROUP THERAPY

In recent years group therapy has been increasingly utilized This has certain economic advantages, as several patients can be treated together This is not, of course, the basis for the treatment Group treatment is designed to re establish the social relations of the patient It is patent that every neurosis is a product of some degree of social inadequacy Conflicts are bound up with social values which the patient in early life has not been able wholly to adopt Moreover, when a patient can be made to ventilate his difficulties, and even be made to express the least amiable traits and impulses of his life in a forum, however limited, he is on the way to a full return of social sense Above all, he may feel himself no worse than others The reader is advised to refer to the books on this growing subject

With this preliminary survey of psychotherapeutic methods, it is possible to consider the treatment of the outstanding psychological disorders of both adults and children

TREATMENT OF HYSTERIA

The treatment of hysteria must be multiplex and varied in accordance with the multitude of forms which hysteria is prone to take, but over and above the treat ment which special symptoms may call for, there is a general hysterical character or personality which requires attention It would be unnecessary to specify the protean clinical symptoms of hysteria, but it would be useful to pay attention to special clinical forms which may call for immediate remedies and handling

HYSTERICAL ATTACKS

Many of the dramatic hysterical attacks which were so frequently seen in the last century, and which have been so brilliantly described by writers such as Richer, Janet (1935) and Charcot, are rarely seen today, but because they are rarely seen, physicians may have lost the necessary touch and sense of urgency for handling them

In the gross hysterical convulsions which sometimes appear to be epileptiform in character, it is rare for patients to come to any harm, but it is undesirable to leave them to work through the attack without some supervision Although they rarely harm themselves during the state of clouded consciousness, they may, as an act of deliberation and for the purpose of claiming attention, do themselves an

injury which should be avoided or prevented A minimum of restraint should be used and the convulsion, if caught, should be allowed to play itself out on the floor Tongue biting and the like is rare, and *gagging is undesirable and unnecessary* The old method of a severe slap or douche of cold water may not be called for but firm remonstration and a measure of restraint somewhere between sympathy and firmness should be exercised The use of drugs such as injections to reduce the sometimes violent spasms, is not to be encouraged, as the hysteric frequently acts very paradoxically to narcotics They can have a delayed action rather than an immediate effect, and patients have been known to pass into cataleptic states as a result of an injection of morphine which can alarm the observer, skilled though he may be It is useful to watch the type of convulsion Some of the movements are symbolic in significance, but many of them are orgastic in the female and fundamentally aggressive in many of the males rare though this may be As a patient passes out of the attack, and this may take a long time it is important to talk to him, to make use of this state of mental twilight and perhaps to lay bare some of the *immediate precipitating causes Patients frequently come to with surprising suddenness*, and may simulate the fact that they have been completely unconscious but

directed towards the elucidation of the situation which may have precipitated the attack However, it is rare for such attacks to occur in complete isolation

...ed before, or there may have been minor crises of excitability

... *immature in*

...ntal love and

protection as a defence against the realities or the hardships which from time to *time they think they have to endure* Sexual frustration or the inability to face consciously sexual fantasies, or actual situations may occasion a relapse into semi-consciousness when orgastic experiences can be enjoyed or when a tantrum

... from outside

There is usually some

has not been met It

must be explored by a careful understanding of the relationship of the patient to his

... *an engagement or marriage*

... family for

...tment and

she should submit to a régime in which understanding ... gathering of ... psychotherapy can be achieved The whipping block for hysterics is now

HYSTERICAL VOMITING

Allied to these paroxysmal attacks are such conditions as hysterical vomiting There are two types of hysterical vomiting those in which the subject vomits in a

disease The handling of these cases is difficult.

The first type will need persistent efforts on the part of the nurse or those in the family who look after the patient to see that food is taken at frequent intervals, that is, as soon as vomiting has ended and, after a period of rest, a meal, light in character, should be given In this way the reflex element in an overloaded stomach is reduced, food is retained, carried on and ultimately assimilated, even if some is rejected in a future vomiting While the patient is in this acute phase, he should be confined to bed with the deliberate intention of limiting his freedom, so that some price is paid for the symptom which in hysterical patients has a secondary gain

be no relaxation of régime In some cases the symptom as such can be dealt with by hypnosis This, however, does not touch the basic causes, and hypnosis should be combined with an attempt to elucidate the unconscious processes at work Should the patient be resistant, and hypnosis and hypnoanalysis fail in consequence, narcosis should be used by the slow administration of thiopentone (7½ grains in 10 millilitres of distilled water) In this semi conscious state (the patient should be kept on the margin of consciousness), the physician can, on the basis of his

Indications for analysis

The indications for analysis will depend upon what is called the ego development of the subject The subjects of hysteria are immature in their emotional development Their instinctual development and their emotional attitude towards them-

than not the fault of a hesitant physician if the man was not restored to fighting usefulness

OCCUPATIONAL NEUROSES

Cramp

In civil life, hysterical pareses, both on the sensory and the motor side, are comparatively rare, but they do appear in less gross forms as writer's cramp telegraphist's cramp and other forms of muscle tension and tremor associated with various crafts These conditions are more often than not insidious in their onset, but they may occur during moments of crisis, thus a quarrel or humiliation at work or an intense disappointment may be the occasion for a fairly sudden loss of skill Two examples are given below

Miss A B, aged 37 years, had been a typist secretary to a gentleman in the city She was devoted to him, held his personal secrets as well as his business correspondence After seven years of devotion she developed typist s cramp At first she could see no [illegible] eeks before the develop-

to express very richly her resentment She would have smashed the machine [illegible]

[illegible] usiness house came into the counting [illegible] did this alone and with a confident flourish On this occasion he was confronted with a new type of pay sheet computed by [illegible] psycho- [illegible] t last [illegible] se in

[illegible] have been noted for a long [illegible] an, in which [illegible] persons of anxious disposition and others occur in those with obsessional characters The former are worrying persons who take offence and "go on strike" They do not usually occur with over-work and are found alongside other anxiety hysteria episodes in the life story The obsessionals do over work as their consciences drive them to the point of exhaustion At this pitch a neuro psychological situation arises These patients require a period of rest and even an entire change of work, or certainly a removal from the situation in which the tension has arisen

Apart from the need for psychotherapy to dispose of the causes of frustration, they may be helped by massage and sometimes by faradism where there is no neuralgic accompaniment It was held by Wilson (1940), Oppenheim (1928) and others that cramp victims usually had a psychopathic inheritance that rendered prognosis poor, but this is no reason for denying the patient the help of psychotherapy to dispel the emotional conflicts of the particular attack

To musicians a change of work would be a disaster Sometimes it is a red light that tells them that they are failing and therefore rest and mental analysis may save them economically, in the long run

MINERS' NYSTAGMUS

Miners' nystagmus cannot be omitted from any study of this type of neurosis. It is demonstrated that it has some relation to the problem of illumination, but as Culpin (1948) and Smith (1948) have shown, those miners who do fall sick with this disorder are of a psycho neurotic disposition and must be treated as such With this the whole question of compensation is bound up In fact there is little doubt that the proper handling of the personality factor is the only correct method of therapy.

OBSESSIONAL NEUROSES

For the obsessional neuroses two therapeutic paths are open (1) suggestion and re-education, and (2) mental analysis

Most obsessional neuroses appear in persons with obsessional characters The more pronounced development of an obsessional ritual of action or ruminative doubt may arise after a period of over-anxiety associated with excessive work, itself compulsively determined The patient presents either considerable anxiety or collapses into a depressive mood If it be mainly the former, the patient may be

faith in his therapist, he will relax a tyrannical conscience at the trusted physician's suggestion, but not otherwise In such cases of troubled conscience, the fear of mental disaster must be allayed, as the patient's horror of insanity is very real When depression takes the place of the obsessional phase, suicidal attempts are not unknown, and the patient will have to be treated as a depressive Generally the depressive patient with a pronounced obsessional character does not respond well to electric convulsion therapy He is usually very tense, and such tension militates against such treatment However, the depressive mood can be temporarily broken off short, and in the benign period which may follow, psychotherapy may be effective.

Most psychoanalysts admit that long term analysis over a period of years does not always hold out promise of cure, but

be so alarming and distracting that normal life becomes impossible For these sufferers prefrontal leucotomy is now performed and some enjoy great benefits without serious loss of intellectual powers or distortion of moral principles, recurrence of the obsessional pattern does, however, take place in some cases There is much still to be learnt as a result of this neurosurgical approach, and even more to be studied by a mental analysis of those who have submitted to the operation

Some patients with obsessions can benefit from occupation therapy based upon the subject's capacity for sublimation, that is providing new outlets for unconscious

urges, but the psychotherapist should be consulted to decide what is the natural line of sublimation determined by the patient's problem and his natural endowments Forcing hobbies and activities on such persons is merely to produce a synthetic product and not an organically self determined outlet

The more the desire is, the more is the sublimation likely to be achieved

TICS AND HABIT SPASMS

These are psychopathologically related to the obsessional states and require the same attention They are, however, even more intractable They frequently subside without interference of a psychological kind It is best to confine one's attention to the personality rather than to the tic unless the latter is of recent occurrence and one which can be associated with a recent emotional crisis Its symbolic meaning may be disclosed by psychotherapy, and its urgency reduced, but in most cases it will be found that some other form of tic or habit spasm occurred in childhood

It is generally held that a constitutional factor of neuroticism exists, and with the

another emotional crisis in the life of the patient

Hypnosis has had some temporary victories, but psychological campaigns are not won by this quick method of alleviating or preventing symptoms

In many obsessional, compulsive and tic cases due regard to the familial and social situation cannot be ignored Correcting of painful situations in a *family, or* a grievance in the vocational and economic field, will reduce the tension which *maintains some of these conditions.*

PSYCHOSOMATIC STATES

In recent years the study of the relationship between prolonged emotional stresses and certain organic disorders has given birth to the psychosomatic attitude towards disease It is rightly styled an attitude rather than a separate department of ... ble that all states of disordered ... *unders Dunbar* ... their different somatic resonances. The worrying business man is a candidate for peptic ulcer, the silent introvert with no great capacity for action is prone to arthritism

Once the train of organic change has been set in motion, psychotherapy cannot ... the engine but it can bring to an end emotions which are *not life-furthering* ...

can be reinstated Here again, when once a character reaction ... tional guidance in the broadest sense can be very valuable in redirecting a patient along less arduous paths A business man with hypertension, or an *arthritic* with frustrated ambitions or domestic disappointments can be helped with a more *healthy currency than to get rich less quickly, or* to go on the gold standard of Myocrisin

PEPTIC ULCER

[illegible]

[illegible] the history of strain will cause the unwary to diagnose hysteria when there are no signs by chemical analysis and x-ray examination Repeated emotional stress, which the patient has kept secret in order to prevent humiliation, begins to have its autonomic effects This will be perpetuated when the [illegible]

the problem through autonomic channels

The fact that vagotomy [illegible]

produced the abnormal vagal activity which surgery attempts to check If, therefore, we can deal with the problem at the cerebral end, we ought to reduce the tendency to vagal over activity In other words, the psychological approach is a rational one

When the "go getting' type of character can be made to rest, to avoid the issues which arouse emotional conflicts, then there is a chance for the ulcer to heal, but with the return to the field of activity which occasioned the stress, the dyspepsia usually returns A change, therefore, in the character reaction must be obtained by psychotherapy

ARTHRITISM

From the point of view of character studies, this condition, particularly *in its* rheumatoid form, is prone to occur in those with strong ambition drives, but who lack the necessary [illegible] as it [illegible] the [illegible] tion

The ambitious arthritic is frequently an asthenic with ectomorphic physique, ambition should be made of sterner stuff It can be speculated that in them the locomotor apparatus gives way at the tendon joint situation Many instances can be cited in which the rapid development of arthritic changes occurred soon after a career had been thwarted or when a marriage had been contracted in which the man allowed himself to be mastered by a wife who thwarted his progress Psychotherapy can help such sufferers to understand both their drives and their limitations For in some cases the patient is actually shunning the possibility of defeat and, as it were, gives way at the knees"

MIGRAINE

This cond tion is related to the all [illegible]

meg [illegible]

the [illegible]

abn [illegible]

salt reduction, he concluded that primarily the condition was due to emotional

difficulties, overwork, and so on Crookshank held the view that the headache was brought on by a state of rage and humiliation That some victims disclose this emotional situation is not uncommonly the case, but there are other affective disturbances which will equally well be found to be amongst the causes of this condition Here, too, the psychosomatic approach is important, *that is to treat the* person rather than the headache and its biochemical correlates

NEURODERMATOSES

There are few dermatologists who do not recognize the part *that emotion plays* both in the cause and perpetuation of skin affections Wittkower has found that continued sexual maladjustment plays an important part in rosaceous conditions The patients are commonly *shy women who have been unable to fulfil themselves* in love or sexuality The blush of shame rising from unconscious sources of guilt suffuses the cheeks and, with the lowering of nutrition and the proneness to skin [illegible] *vasomotor irritation of the skin super*

[illegible] nts

[illegible] help

towards recovery or at least to greater powers of resistance

[illegible] through the normal phase of

ASTHMA

It is now generally agreed that asthma is a respiratory disorder which is *closely* related to the emotional life Even when the attacks appear to take place without any psychological preparation, a careful history will reveal that in the early days of the condition some psychological stress has precipitated the paroxysm When, *as in* adults, it is so frequently associated with chronic bronchitis, the paroxysm will take place almost as a conditioned reflex and the psychological cause, if any, may not be in operation at the time of the attack Excluding the adult type, which *has not* occurred before the development of the bronchitis, most other cases will have had a history of asthmatic attacks in childhood

If we examine the paroxysm from the point of view of emotional expression, *it* is not always difficult to notice that the expression of the patient is a mixture of *alarm and anger* As, in childhood, breath-holding is an expression of rage, so, in the asthma attack, psychotherapy will reveal emotions of a similar *character* [illegible] hold that the asthmatic attack is

[illegible] ises are on record

[illegible] of the *asthmatic*

condition Unexpressed rage and humiliation play a part in the condition and although allergic factors seem to be a necessary part of the symptom complex, they themselves do not always operate in the absence of a psychological *cause* When the reason for rage or for sexual incompetence is laid bare, the tendency to paroxysms can be markedly reduced

In childhood, asthmatic attacks are more prone to occur in coddled children. Starting in infancy with breath-holding rage, all subsequent occasions when frustration of the child's desires takes place will produce spasmodic breathing which will pass on to the full paroxysm In one case, a boy developed asthma during a storm on board a ship when he felt that he might be cast overboard by the violence of the ship's movements, and that he would suffocate. In other cases which have been carefully investigated, the asthma started in ravenous children who, at the breast, were insatiable, took more than they could swallow and had paroxysms In consequence, whenever dissatisfaction about food occurred, similar paroxysms, as if

another example, a boy with an asthmatic attack was suddenly confronted with the explanation of his symptoms by the play therapist He ran from the room, returned to his mother and said "I do not want to see that horrible woman again " He came home, and for two or three days showed open expression of rage The therapist told the mother to expect this, but not in any way to check the child This child did not have another asthmatic attack

To cover all the intricate emotional causes which lie at the bottom of psycho-

asthma victims are prone to paroxysms of rage which, if allowed full play, will sometimes abort the attack

Sexual Maladjustments

Reference has already been made in passing to the various sexual disorders that lie at the root of anxiety states, hysteria and the obsessional neuroses

Freud originally held the view that most anxiety states were due to errors in sexual technique, such as coitus interruptus The excessive tension set up by this

many of these disorders ignorance and sexual guilt lie at the bottom of these problems Nevertheless, when advice on sexual hygiene is not enough to bring to an end the panic feelings, it may be necessary to probe further into the marital relationship Here one may find that the love relation is far from satisfactory Secret emotions have entered into the mind of one or other of the partners and the guilt must be faced before the symptoms can be allayed

incompetence

To embark lightheartedly into a full Freudian analysis in all cases of sexual dis harmony expressed overtly in an anxiety state or an anxiety hysteria might easily imperil a marriage It is therefore the duty of the doctor to ascertain at the earliest moment whether the given personality *is sufficiently resilient and enlightened to* face deeper self knowledge It is doubtless equally true that the anxiety state may itself be the first intimation that that marriage is about to break In such cases it is *imperative for both husband and wife to be interviewed* Sometimes, in order to dismiss the danger of partisanship, each partner might well be seen by a different doctor, and that the two physicians should confer in order to present the couple with a reasoned exposition of the psychological situation It may be necessary for

nature of some modern marriages is bringing home to many the growing danger of the breakdown of the family to our social life

There are many problems of marriage that have not reached symptomatic level that is to say they have not produced neurosis but a conflict of character A sane discussion, particularly of young couples with a physician, not necessarily a psy chiatrist, but withal one who is at least psychologically minded, may help them to

Homosexuality

Homosexuality as a psychological problem in both sexes may only come to treatment when some other group of symptoms is subject to analysis It requires very great analytical skill to steer the patient through this turbulent stretch of psychological water If the psychiatrist soon becomes aware of *this disturbance in* the character of his patient, he must weigh up with care what forces the patient has to meet the revelation in himself of an anomaly which has social repercussions

It is a sexual divergence that cannot easily be removed, although some claim that it can be In the midst of a treatment for another and wider psychological disorder, the patient *may* take the rough with the smooth and accept this disturbance with the many others he has to endure during deep psychological analysis Its occurrence, however, may place a burden upon the doctor, particularly with regard to advice as *ting union*

ell their tendencies, come to are for a change in psycho- nt who comes fired with a desire to be as other men (or women) are, there is some chance that a change can be *achieved*, but only *after* a warning that the course will be a very long one

However, many come because parents think there is something strange about a young man's or a young woman's avoidance of the opposite sex or in their posses sion *of characteristics of inversion*

The homosexual who is satisfied with his lot, and who in addition feels that his productiveness, particularly in the arts, is bound up with the inversion or the anomaly is, indeed, likely to prove the most unsatisfactory of patients

PSYCHOSEXUAL IMPOTENCE

Many cases arising immediately on marriage can be dealt with by very superficial aid The condition under these circumstances may arise from sheer ignorance of the sexual act, or an excusable coyness of the *prima noctis* Some cases have arisen when the young couple return to live in the parental home, housing adjustment will frequently remedy this To be overheard is the greatest fear in others, and advice on reasonable isolation, which even the beasts of the field prefer, may be all the advice that is necessary Yet there are many victims of this inhibition who have deeper trouble than the above Homosexual undertones lie beneath many of these problems Psychoanalysis has certainly shown that the operation of unconscious incestuous fears is responsible for most of the cases which cannot be resolved by fairly simple sexual hygiene

The problem is a serious one, as it may involve a marriage annulment when the other party cannot accept continued sexual deprivation There are, of course, many men who are impotent with their wives but who are potent when another marriage is contracted

In all cases psychological advice must be sought in order to save a marriage from dissolution The length of treatment required must be frankly admitted by the therapist who undertakes this work of salvage as well as of cure

NEUROTIC DISORDERS OF CHILDHOOD

INTRODUCTION

The neurotic disorders of childhood should cover disorders of behaviour or what is called conduct, because on psychological inspection they frequently have common roots in the soil of primitive instincts and emotions as well as in certain acquired organic defects and hereditary disorders and dispositions Nevertheless, as social investigations of the cohesion and economic difficulties of families have shown, more superficial environmental stresses play their part

Therapeutic efforts at cure or amelioration will, therefore, be directed towards removal of causes at various levels in the unfolding child life

EPISODIC DISORDERS

Epilepsy

When hereditary factors are concerned, as in idiopathic epilepsy, we can do little to deal with the convulsive tendency but reduce it to zero by drugs, or reduce its frequency of occurrence both by drugs and by removing such stresses as provoke an attack Today, however, with advances in neurology, encephalography and the encephalogram, many idiopathic cases are moved to the organic group, and indeed a number of children with epilepsy and behaviour disorders can be very materially benefited by concentrating our attention on the psycho-biological aspects (*see* Epilepsy, page 281) In this section we are concerned mainly with the disorders rightly called epilepsy, but which taper off into psychic equivalents and such twilight states and episodic storms of rage as are placed in this group by the electro-encephalographic findings or because of the general character traits as accompany the epileptic diathesis

Apart from medicinal, nutritional and sociological remedies for the fits as such, there are many broadly psychological methods of handling that prove fruitful

Educational adjustment of epileptic children.—This will depend on the natural endowment with respect to intelligence. Ordinary schools, whether State or private cannot be expected to deal with such sufferers. The children's *petit mal* attacks

mischievous habits and impulsiveness and is unduly indulged by parents. Even at home this character and behaviour aspect makes training and future vocation very difficult. With deterioration and the supervention of acute and recurrent behaviour disorders of the most alarming kind, such as violence, cruelty and sexual lapses institution care will become imperative. Children should never be allowed to be alone during attacks of epileptiform tantrums and mischievous spells—these may easily pass over into major attacks.

Minor episodic disorders

Other attack disorders are sometimes confused with epilepsy, such as breath holding, fainting, wanderings and sleep-walking. These are due to emotional spells and must be treated as such both at the time and at long term by psychotherapy or environmental adjustment. The spell may be due to jealousy of a newly born

from parents.

Sleep-walking.—This disorder should never be treated by sudden waking of the child. The child should be quietly led back to bed with accompanying affectionate gestures on the part of the mother or nurse. All the bizarre movements, acts and remarks should be carefully remembered for the information of the doctor and particularly for the psychotherapist who may be consulted with a view to treatment (*see* Child Guidance, Play Therapy, page 1087).

In these events lie wrapped up the emotional impulsions which cause the walking. The child may be re-enacting an unfulfilled task at school, or perhaps, as in some cases, bent upon carrying out a destructive intention or wandering off to a never-never land dreamt of and far different from the frustrated life at home. With such knowledge at his command, the doctor can help to correct parental mismanagement, and shortcomings at school, or he may need the more recondite help of the psychologist.

Fainting attacks.—These may be associated with the sight or fantasy of an injury, and the disclosure of these fears may bring such attacks to an end when there are no basic or aggravating causes, in the heart or in the metabolic processes (orthostatic attacks, hypoglycaemia and instability of the autonomic) which require physical paediatric attention.

Gastro intestinal attacks.—These attacks, with doubling up pains or dyspepsia and sickness, are not infrequently found to come over a child who is doing badly at

are frequently coddled at home, where love and over solicitude is an anodyne to an

child's emotional relations with parents or siblings are at fault The child may be

children react well to psychological handling after initial fears of a clinic are dissipated, and they feel themselves understood in the playroom of the therapist Not infrequently a period away from home, where an over-solicitous or too mana-

HABIT DISORDERS

The psychiatrist is constantly called upon to help with individual symptoms, such as thumb-sucking, masturbation, nocturnal and diurnal enuresis, and night terrors Most psychiatrists today will deprecate the attempts to treat monosymptomatically—physicians do not treat the rash of chicken-pox or the Koplik's spots of

treatment

Food Refusal

with the sense of refusal The clean flow of milk is different from the clinging gluey ness of the skin of the milk which later is taken from a cup, and so *in this way* the child may develop a complex attitude towards food of this kind

MASTURBATION

at puberty to actual sexual pressure incubated by the furtive knowledge gained

sions, both by intent, or as a result of seduction, must be dealt with by actual

viour

but

join

d co-

operative bent to the child s leisure hours

INDIVIDUAL TREATMENT

Although in a large number of cases the foundation of a disorder of conduct in a child may not have been occasioned by the mismanagement of the parents who have according *to their lights done justly and lovingly by the child* the latter s repeated claims upon the parents, largely the mother, may relentlessly produce responses in the parent of hostility and impatience born of a not unnatural irrita tion and weariness with a refractory and bad tempered child The parents resent

threats

parents, and the parents' teeth are set on edge In treating such a child the parents *need urgent help in understanding* the basis of the disorder which resides in the

experi

ng or by

gression

otection

root is

in punishment or the threat of it, but

unearthed

and

the same time is brought to a *simple realization* that aggression

expressed or wholly condoned, but that he can overcome the guilty feelings by

turning from destruction to construction, by making good the wish to injure the offending parent whose very destruction he most fears When a child passes to construction and acts of reparation, the cure is achieved and the child can now use his powers for acts which are co-operative and which are much more likely to win love and help. The very therapeutic atmosphere of understanding allows the child

... harassed parent

PLAY THERAPY

Play therapy for children from the toddler stage to puberty is the technique ideally suited to the child mind Play is the child's language of self-expression

plays out his feelings in the presence of the therapist who watches not only the

should understand this activity and should adroitly, through co-operation and not in merely watching, interpret back to the child

Freedom to play is not possible to all children Some are afraid of their own ... whereas others are too inhibited and intimidated to venture

further understanding

CHILD GUIDANCE CLINICS

In the technique of child guidance the educational psychologist not only estimates the child's intelligence and disabilities but he or she can:

SOCIAL WELFARE

The social worker for her part not only gives a living picture of the home with its disharmonies, and the environment with its constrictions and moral dangers, but

(a) she can discuss problems of mishandling with the parents at the psychiatrist's suggestion,

(b) she brings to the doctor the emotional problems of a parent which may call for [illegible]

[illegible]

efforts

JUVENILE DELINQUENCY

The general considerations already discussed in relation to habit and conduct disorders in children hold equally in the various forms of juvenile delinquency, of which *stealing is perhaps the most frequent indictable offence It has been found,* particularly as a result of the war evacuation problem, that early separation from the mother is the outstanding cause of this type of offence The absence of the father during the war years, or the lack of love between parents which even the young child can sense, is also a cause of delinquency, but we cannot deny the effect of bad companions and neighbourhood influences of a depraved kind

Boys' clubs and girls' clubs, adequate play space, and the provision of leisure time activities will obviate many a disorder of conduct which takes on an anti social form The good effects of these provisions will be increased where there are good club managers and sympathetic probation officers who are not merely prying custodians, but friends who in some degree take over the role of an absent parent

[illegible]

treatment or who even spurns the kindly efforts of the social worker and the therapist [illegible] considered [illegible] complete change of environment with [illegible]

needs special attention, and is placed in special schools, and we shall shortly see the psychopathic child and adolescent receiving attention at establishments which are to attempt treatment by training in social usefulness as well as by segregation for the public safety

THE GENERAL PRACTITIONER'S ROLE IN THE TREATMENT OF NEUROSES

In virtue of the high incidence of neurosis in the general population, it is clear that only a fraction can be seen by psychiatric specialists and fewer still can be given continued prolonged treatment Nevertheless, it is just and socially important that as many as possible should be given understanding examinations and at least

life, economic, social and familial, which a worldly wise physician interested in human nature could tackle with time, patience and a readiness to abandon mechanistic theories bred in him by the prevailing ideologies of medical teaching

When once a physician has listened to a recital of anxiety symptoms or vague pains and discomforts for which no physical basis is discovered after careful examination, he should straightaway put aside a consideration of the *corpus vile* and consider the human mind of his patient Certainly in the past, and only to a lesser degree today, the physician knows his patient's personal equation as a result of his contact with the family He may have seen his patient in early life, followed him or

rifts between husbands and wives, parents and children, will produce that ventila-

One of the commonest features of everyday life is the presence of worry More

Patients with this disposition need a sympathetic and patient care This does not mean that the physician lends a willing ear and then administers banal comfort These patients are asking for assurance that they have not done wrong, and that their nagging fears are not preludes to worse emotional disorders A little probing will reveal either the meticulous character whose conscience is never satisfied, or

himself and to others In such history disclosures the doctor may, of course, light upon a recurring pattern of blaming others and even of attributing malign intentions to others While sympathetically adjudicating, the doctor may be suspicious of a paranoid trend which calls for careful psychiatric inspection

As regards the marital problems, these may be due to a lack of tact or even know-[illegible]

[illegible]

condition, which provides him with the wherewithal for summing up a social as well as a *psychological situation. Moreover if he is a man of experience he* will sense a psychosexual situation without probing into those depths where lies not only truth but terror. When the physician sees not a fairly common human situation, but the clash of neurotic personalities, it is at that point that he may need the advice of the expert.

In short it can be said that wherever a psychological impasse is subclinical in [illegible] *character traits which* [illegible]

EMANUEL MILLER

[illegible] London, Hutchinson

REHABILITATION

HISTORICAL INTRODUCTION

The word "rehabilitation" means a restoration to a previous condition, or the

competence that he enjoyed before his illness or accident Its more recent extension is to improve the health and strength of sub standard individuals

In the recovery of a patient to the state of health and competence that he enjoyed before his illness or accident, the physical and psychological aspects of rehabilitation are of equal importance In Great Britain, the first recorded instance of this twofold aspect of recovery is that of a man called Alfunyne, who incidentally was the earliest patient of St Bartholomew's Hospital of whom any record has been

World War (1914–1918) added many contributions, particularly in the field of orthopaedics During this period, also, several civilian developments of importance took place, notably the work done by St Dunstan's in the resettlement of the blind, and by the Papworth Colony in the resettlement of those with tuberculosis

In 1929 H E Griffiths put into practice an original and controlled plan of

zontal posture and relative immobility are mitigated or prevented by the exercises he prescribed (An outline of treatment for a bed patient is given at the end of this chapter)

World War II gave a great impetus to work in this field of medicine and it became intimately connected with the contemporary teachings of "social medicine" and

"positive health" The urgent need to make the fullest use of all available man power brought the medical profession into close touch with the government departments whose duty it was to deal with the employment of men and women to

made him fit for active service The final extension of the term rehabilitation in-

will be given

RESTORATION TO EFFICIENCY

In order to obtain speedy return to maximum efficiency, three cardinal principles must be remembered and put into practice

STUDY OF THE WHOLE MAN

First, the problem involves the study of the whole man, in which the physical, psychological, social and environmental aspects must all be borne in mind Emphasis on any one of these to the exclusion of the others will lead to failure A catholic outlook must be brought to bear on every case

CONTINUOUS PROCESS OF REHABILITATION

Secondly, it must be realized that rehabilitation is one continuous process, beginning at the moment when the patient is considered capable of taking an active interest in his recovery, which may be the first day after his accident or onset of illness, and progressing through the in patient, out patient and convalescent stages, and ending with his final hardening to the requirements of his original job If the individual cannot be rendered fit enough to return to his original job he must be trained for an occupation best fitted to the full utilization of his resultant capacity, he must be placed in work which exercises all his available faculties and not in work which is within the easy compass of his competence

TEAM-WORK

Thirdly, team-work is essential to rehabilitation This involves co operation between the various hospital departments, between hospitals and school and industrial medical officers, between doctors, dentists, and medical auxiliaries, including physiotherapists, occupational therapists, physical educationalists, almoners and chiropodists, and between doctors and lay members of the educational and social services, including teachers and industrial resettlement officers

IN-PATIENT REHABILITATION

It is not sufficiently appreciated to how great an extent the general physical condition may be maintained whilst the patient is still in bed There are, of course, certain contra-indications, such as age, pyrexia, exhaustion or pain, which preclude physical re education during the early stages of recovery, but in many cases convalescence

is materially shortened by the institution of simple exercises prescribed in detail by the doctor (*see* Supplementary Note II) At the earliest opportunity such exercises should be supplemented by the more technical methods of physiotherapy, including massage, assisted and resisted exercises, and electrical and ray therapy

These measures should be prescribed in detail, supervised by a doctor conversant with them and carried out by a chartered physiotherapist if possible

In the earlier stages of disease and disability, the psychological support which physical treatments can give reinforces their practical value The patient's co operation in the treatment is all important and his urge to recovery can be strengthened by the influence of the physiotherapist Passive treatment must, there fore, give place to active methods at the earliest opportunity Provided muscular contraction and relaxation are carried out systematically and under precise medical prescription, the damaged structures do not suffer By this means a deterioration of physical condition due to the patient's immobilization in bed is reduced to a minimum and when the patient proceeds to the out patient department, convalescent depot, or rehabilitation centre, there is no need to begin with a process of general reconditioning

There comes a time in the course of all serious disease and disability when an assessment must be made as to whether the patient will be able to return to his former employment, whether some modification of his original work will be necessary, or whether a new vocation must be found for him The decision should be made as early as possible, particularly if the patient has to go to a new job, so that the trained occupational therapist may help the patient to decide as to new employment, and it may be possible even while the patient is still in hospital to provide means for him to educate himself in the new employment which is in prospect

O [illegible] al and [illegible] value [illegible] value in the production of a creative interest in the mind of a long term patient, especially when there has been mental trauma, and in the presence of neurosis Remedial occupational therapy, on the other hand, is of value in disabilities of the locomotor system It entails the choice, utilization and adaptation of different crafts in the reeducation of muscles, joints and nerves

OUT PATIENT REHABILITATION

In the out patient department, the work done in the ward is continued without interruption, but the hospital atmosphere should now be kept in the background [illegible] health and disability are provided

Emphasis should now be placed on class work The classes should be composed of cases of similar types of disability as for instance, abdominal post operative cases, thoracic cases postural deviations, and foot defects, and of patients in a similar stage of recovery or performance The exercises are chosen for the correction of specific defects and they are carefully graduated according to the patient's capacity Class work in remedial treatment is all important, but its success depends

upon the personality of the instructor. In order to inculcate and maintain a spirit

misfortune

It is at this stage that the almoner and the disablement rehabilitation officer (D R O) can be of particular value The function of the almoner *is to collate the*

various factors The function of the disablement rehabilitation officer is to place the *patient in employment which, having regard to the circumstances, he is best* fitted to undertake It is essential, therefore, that he should be fully conversant with local industries and with all vacancies suitable for disabled persons

so that continuity of care may be maintained Rehabilitation centres may be

at spas or health resorts and should

bilita-
tion of general medical and surgical cases, which can and should be treated without segregation, and that of special cases including orthopaedic, psychiatric, the tuberculous patients and the totally blind, in which the continuance of expert guidance is essential In principle, however, it is wise to cover as wide a range of disabilities as possible in a rehabilitation centre

INDUSTRIAL REHABILITATION

With the object of combining restoration to maximum functional capacity with revocation and re-training under medical guidance, the Ministry of Labour has instituted an Industrial Rehabilitation Centre at Egham The Centre admits both post-hospital patients, for the later stages of their resettlement, and cases of

Centre,

ge of the

requirements of the various branches of *industry* His capabilities are assessed under the guidance of a technician who appreciates the nature of the work, and in consultation with a medical man who knows what the individual is physically and psychologically fit for

Many large industrial firms have established their own rehabilitation centres and workshops They endeavour *to replace their operatives* within their own fabric, while still receiving pay The bridging of the gap by gainful employment has a good

psychological effect Medical reinstatement is under the control of the industrial medical officer, who forms the most important link between the worker, the employer, the hospital and the general practitioner

Slough Industrial Health and Recuperative Service

In the case of the small firm, the problem is more difficult because reinstatement can only be satisfactorily undertaken in organizations in which a wide diversity of occupation is available from which to select suitable re-employment To solve this problem the Nuffield Health and Hospital Services Fund has launched a comprehensive experiment in collaboration with the Slough Industrial Health and Recuperative Service The location is ideal for the purpose, as it comprises some 300 small factories engaged in different trades and industries

The objects of the centre are (a) to offer advice in relation to selection of vocation and to the prevention of occupational disease and injury, (b) to provide facilities for rehabilitation and re-employment (the facilities in this respect include a mobile ambulance service for immediate dispatch to the site of the accident, a physiotherapy and occupational therapy centre, and a recuperative home for those suffering from physical strain and for the later stage of convalescence), and (c) to carry out research into the different problems of industrial rehabilitation

Disabled Persons Employment Corporation

Finally, mention must be made of the Disabled Persons Employment Corporation Its function is to provide employment in the Corporation factories, workshops,

known as Remploy factories, of a type suitable for severely disabled persons For those so severely disabled as to be unable to travel to and from a factory, home work will be provided

VOCATIONAL GUIDANCE

Selection of vocation is an important sphere of medical usefulness The more fortunate members of the community are able to make up their minds at an early

into a vocation which is entirely unsuitable Industrial psychology has concerned itself with the correct placement of operatives on grounds of aptitude and intelligence A collateral assessment is needed on physical grounds

Pulhems System

bodily and mental function—Physique, Upper Limbs, Locomotion, Hearing, Eyesight, Mental Capacity and Emotional Stability, in each case the degree of efficiency is noted by an index number, usually 1-5 The physical and mental requirements of

the various jobs available to him are similarly assessed It should thus be possible to place the individual in the employment best suited to his capacity

In assessing physical capacity, the decision should be based on functional ability and not on anatomy or physiology, for no anatomical or *physiological test has yet* been devised which is capable of measuring potential physical performance The various exercise tolerance tests, vital capacity estimations and measurements of *all kinds* are equally at the mercy of the enthusiast, the malingerer and the moron Neither should anatomical lesions form the basis of assessment

PURPOSEFUL TRAINING

Purposeful training for future employment follows as a natural sequence upon selection of vocation in the achievement of maximum physical efficiency It is sur

al is in even the simplest acts, such as

ection of faulty technique may prevent

UP GRADING

Rehabilitation has been extended during the past decade to include the treatment of maladies and disabilities while still in a remediable stage It is, indeed, the upgrading of the sub-standard individual to his or her maximum health and efficiency

Positional discomforts, although minor in character, may become a major factor in causing ill health when operative over long periods of time In the case of lorry drivers, for instance, the driver may be cramped for space, the clutch may be stiff, the gear and brake handles may be in an awkward position, and the driver's seat badly designed The back support, the function of which should be not only to maintain a normal sitting posture, but also to act as a fulcrum for the necessary *leverage, is often inadequate in size, angle and adjustability And so, in the treat*ment of such patients with pain in the low back, sciatica, fibrositis or brachial neuritis, there is need for detailed investigation as to possible causes connected with his day to-day life, and especially with his posture at work

Another example is that of the clerk or sedentary worker who is habitually overtired and gets ill as a result of working long hours in a bad light, or in an ill ventilated or over-heated atmosphere, in an over-crowded room or in a constant noise due to the nature of the work in progress Another important debilitating factor may be the effect of boredom, due to the monotony of the work The symp*toms complained of—fatigue, both mental and physical,* lassitude, and lack of power of concentration—may be remedied by advice as to exercise, organized games, artificial sunlight and last, but not least, advice on relaxation and the proper use of leisure

The attention of the medical profession is now being directed to the health and development of adolescents with a view to promoting the *best level of*

lution of this problem

there were already in

being two Army centres which catered for young recruits who were below the statutory requirements of the Service at that time With the outbreak of war, their field of usefulness was extended and a number of Army Physical Development

Centres were opened, first for young recruits of poor physique due to under-development and malnutrition, and for those with postural abnormalities due to occupational and environmental causes and secondly for soldiers in Field Force Units who had broken down because of poor locomotor and other disabilities Careful selection was made in order that only those cases likely to show substantial improvement were referred to the Centres, those associated with rigid deformity, for instance, were excluded Ultimately a Centre was opened, and organized on somewhat different lines, for the physical improvement of sub standard members of the Auxiliary Territorial Service

mind

reached by a steady increase in load frequency and distance The necessary mental stimulus is provided by the inclusion of games of a quickening and co-ordinating character Particular attention is paid to the prevention of fatigue, both physical and mental In preparing the daily programmes of each group, the periods are arranged so that the more strenuous sessions alternate with those of a more recreational kind There is a break in the middle of the morning, and trainees again relax on their beds for half an hour after the midday meal Attention is paid to the good use of leisure when the day's work is done

Physiotherapy for individual treatments is undertaken by qualified members of the Chartered Society of Physiotherapy There is a boot inspection during the first week, when all misfitting and badly worn boots are replaced and special cases are referred to the cobbler with prescriptions for alteration The chiropodist has a most important function to fulfil In addition to treating corns, blisters, ingrowing toe nails and other abnormalities, he gives instruction in the maintenance of foot

relative value of different kinds of exercise and treatment has been assessed It has been shown also that improvement is effected in the mental as well as the physical alertness of the trainees The success of such a centre greatly depends, of course, on the detail of its organization and administration But it depends even more on

The institution of civilian centres would involve certain differences in technique from the Army scheme The age group would preferably, be somewhat lower The educational aspect would become relatively more important and would assume a somewhat different character The final recommendation as to placement in

industry would require a method of vocational selection, designed to meet the requirements of the various civil trades But the procedure adopted in Army practice, which has emphasized the importance, *not merely of finding a job for a*

Quite apart from such work as may be done in organized centres there is in this "up-grading' a new opportunity for medical men both in family and industrial practice

FRANK HOWITT

SUPPLEMENTARY NOTE I

creative work, namely carpentry in which trade he had served as an apprentice before his illness

In *The History of St Bartholomew's Hospital* (Moore, 1918) the description of this patient is quoted

> *An other man Alfunyne by name in the town of Dunwich that dwelt on the seaside* was so crippled that he could use neither hand nor foot his legs were cleaving to the
>
> works such as distaffs and
> n other parts were able to

SUPPLEMENTARY NOTE II

REHABILITATION IN PATIENTS CONFINED TO BED MOVEMENTS AND EXERCISES

Geoffrey Evans, writing on this subject in *After-care and Rehabilitation*, advocates a plan of treatment in the following terms

Complete rest in bed is an unnatural state It interferes with the functions of the body, and is often irksome to the patient It is liable to cause constipation, lumbar discomfort or even pain, and old people are very liable to develop congestion at the base of the lungs. After any severe illness or prolonged confinement to bed when first allowed up, the patient is often hardly fit to stand is certainly unable to walk, and may be found to have foot-drop Yet all these disabilities can be prevented, or at least mitigated, by close attention to the patient s posture in bed and by controlled exercise of the voluntary muscular system.

The plan of treatment prescribed is as follows —

While Confined to Bed

lumbar ligame

on his back with a little pillow under

le lying in this position he or she is in-

backwards at the same time rotating

boids and lower fibres of the trapezius

a dorsal kyphosis, as a result of the

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chin, and by this

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This plan of treatment, and particularly the anti gravity exercises, is prescribed for all those who are expected to be confined to bed for more than ten days, and it is con

sides of the head and movements of the head and neck A patient with active tuberculosis of the lungs, or one with gastric ulcer, who has had a haematemesis or for whom a low calorie diet has been prescribed, can in addition to the above be put to lie flat on his back once or twice in the twenty-four hours In the case of active pulmonary tuberculosis, anti-gravity and breathing exercises are contra indicated It is often a nice decision when to start the breathing or anti gravity exercises Thus, in congestive heart failure with oedema of the legs, anti-gravity exercises, so far as they involve the lower limbs, may be started as soon as, or soon after, recovery begins, because they promote the return of blood from the periphery to the trunk, and so help the circulation and disappearance of the oedema There are patients, too, in whom a general improvement takes place as a result of the exercises, an improvement which is shown by a considerable diuresis In general terms the presence of an infection is a contra indication to the anti gravity exercises, and they are therefore not prescribed in rheumatic heart disease during its active phase

Controlled exercise of the voluntary muscular system has another therapeutic effect It is well known that visceral disturbance affects voluntary muscle tone and activity Thus chronic dyspepsia is often accompanied by poor tone and development of the ab-

exercise of the physiologically related voluntary muscles This is commonly made use of, for instance, in the cure of constipation by voluntary muscle exercises, and it has of course an application to all viscera in the structure of which unstriated muscle forms a part There is the additional effect of voluntary muscle activity on the circulation as shown, for instance, in the effect of free movements of the neck and shoulders in the relief of certain kinds of headache

Exercises During Convalescence

In conclusion, the exercise of voluntary muscles affects emotional tone It is a fact that the attitude of the body affects the attitude of the mind A number of common phrases have reference to this fact, as for instance when we speak of "a stiff upper lip", "facing the music", or "standing four square" As already mentioned, the rhythmical

Appendix I

ANTI-GRAVITY EXERCISES

the skin of the plantar surface of the toes may require to be stretched

It may help the patient to do this exercise if he makes the same movement with his fingers (keeping the fingers straight) at the same time that he flexes the toes

The purpose of this exercise is to strengthen the small muscles in the feet Their action is to keep the toes in relation to the ground in standing and walking

2 While keeping the leg straight the foot is bent upwards towards the knee This movement should be made by the tibialis anticus alone that is without simultaneous

that the long extensor tendons of the toes do not come into play)

The purpose of this exercise is to prevent foot drop A bolster should be placed across the foot of the bed under the bedclothes to hold the weight of the bedclothes off the feet Alternatively a cradle is used

3 A hand is placed under the knee and the knee is pressed back against the hand behind it It is a help to a patient to have a partly filled hot water bottle under the knee for this exercise When these exercises are mastered nos 2 and 3 can well be done together

back on the hand placed behind it

This exercise strengthens the lower muscles of the abdominal wall especially the external oblique muscles

6 Place a hand on the dorsal spine The patient l es quietly back on the hand and is told to fix his attention on the muscles under the hand and to draw his shoulder blades

kyphosis)

7 Push the neck against the pillow behind it and draw the chin in In doing this exercise the patient is to avoid hollowing the back

This exercise prevents the over-extended neck and up-tilted chin It corrects too the tendency to stoop

These exercises assist the circulation By emptying the veins from the feet (exercise no 1) upwards they assist the return of blood to the heart This return of blood to the heart is completed by a breathing exercise

Imag ne a vacuum or empty space between the breast bone and the spine Allow it to f ll with air by breathing in deeply through the nose Put the hands on the sides of the lower chest and gently push out sideways against them Breathe out quietly through the open mouth The patient should be taught to breathe out before breathing in

(*Adapted from Shorter Convalescence by Lt Col James K McConnel D.S O., M C., and most kindly edited and corrected by him*)

This plan of treatment, and particularly the anti-gravity exercises, is prescribed for all those who are expected to
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Exercises During Convalescence

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Appendix I

ANTI-GRAVITY EXERCISES

told to imagine he is standing on the
the soles
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eliminary

the skin of the plantar surface of the toes may require to be stretched

It may help the patient to do this exercise if he makes the same movement with his

contraction of the long extensor muscles of the toes The patient's attention is drawn to the contraction of the tibialis anticus by placing his finger on the fleshy belly of the muscle, by observing the tendon to stand out as it crosses the inner side of the bend of the ankle and by observing that the toes do not move independently of the foot (and that the long extensor tendons of the toes do not come into play)

The purpose of this exercise is to prevent foot drop A bolster should be placed across the foot of the bed under the bedclothes to hold the weight of the bedclothes off the feet. Alternatively a cradle is used

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6 Place a hand on the dorsal spine The patient lies quietly back on the hand and is told to fix his attention on the muscles under the hand and to draw his shoulder blades

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This exercise prevents the over-extended neck and up-tilted chin It corrects, too, the tendency to stoop

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(Adapted from "Shorter Convalescence" by Lt-Col James K McConnel, D S O, M C., and most kindly edited and corrected by him.)

Appendix II

UPRIGHT POSTURE

To attain the upright posture after standing up, the following three movements are made —

(1) Brace the knees back
(2) Tighten the buttocks and tuck in the tail
(3) Lift the chest.

The first movement brings the quadriceps extensor into full action it exercises the same muscles as those involved in Anti Gravity exercise no 3

The second movement brings into action the glutei maximi, which muscles extend the trunk on the lower extremities, and by synergic action tone up the muscles of the pelvic floor

The third movement flattens out the abdominal wall by increasing the distance be- [illegible]

waistcoat buttons are to be kept tight

No attention should be paid to the abdominal muscles They tighten up automatically [illegible]

oblique muscles

[illegible] The patient is advised to [illegible]

reverse of their movement in standing upright, when they are tucked in)

(By courtesy of "The Practitioner")

British Medical Association (1946) "Report on Rehabilitation," *Brit med J*, 1, 187
McConnel, J K (1930) *Shorter Convalescence* London, Heinemann
Moore, N (1918) *The History of St. Bartholomew's Hospital*, Vol 2, p 863 London, Pearson

"RHEUMATISM" AND ALLIED DISORDERS

ARTHRITIS

ACUTE

When one sees an acutely painful and swollen joint in an adult patient, who gives no history of injury sufficient to account for the condition and who is not subject to haemophilia, three diagnoses should cross one's mind acute rhematism, gout and specific infective arthritis, including suppurative arthritis

ACUTE RHEUMATISM

In acute rheumatism there is often a past history of rheumatic fever and perhaps an old cardiac lesion, but sometimes the condition commences *de novo* in the 20–40 age group following a week or two after a nasopharyngeal infection or even in the presence of a less obvious focus of non specific infection Such cases will often react to full dosage of salicylate, 20 grains 4-hourly, given with an equal dose of bicarbonate If this does not remove the pain and bring down the temperature, aspirin or calcium aspirin should be employed Local treatment should consist of heat and rest along the lines detailed later Removal of a focus of infection, when this is possible, should be delayed until after the activity of the joint condition has abated or until a month has been allowed for this purpose If the focus should be the teeth, they should not be dealt with all at the same time (*see* Septic Foci, in Rheumatoid Arthritis, page 1110) and penicillin administration at the time of operation is advisable (*see* also Rheumatic Fever, page 192)

GOUT

In gout, the diagnosis may easily be missed if the first attack occurs in such a joint as the shoulder The onset is usually very acute often occurring in the evening, sometimes following trauma, an operation, worry, infection or a bout of wild eating or drinking In 3–14 days there is a complete remission Colchicum in full doses, colchicine, $\frac{1}{120}$ grain 3 hourly till there is some diarrhoea or nausea, will produce a rapid temporary relief of symptoms (*see* Gout, page 1127)

SPECIFIC INFECTIVE ARTHRITIS

[illegible]

perhaps with a conjunctivitis and blenorrhagic dermatitis of the hands and feet (*see* Gonorrhoea)

Specific treatment consists of the use of the sulphonamides or penicillin according to the sensitivity of the organism and, in the case of a gonococcal infection, of

pyrotherapy In some resistant cases vaccine treatment may be considere Rheumatoid Arthritis, page 1110) The sulphonamides should be used in the dosage according to the compound selected For *general purposes* sulphathi 1 gramme 4-hourly, with plenty of fluids is usually satisfactory *but for dyse* sulfasuxidine or phthalylsulphathiazole is more effective When penicillin is 200,000 units 8-hourly is usually satisfactory or, if injections are undesiral *Tabloids of 20,000 units each of Calcium Penicillin* may be given 3 hourly 2

Pain should be relieved by the use of an adequate dosage of coal tar compo *a useful* prescription being, aspirin, 10 grains, phenacetin, 5 grains, and caffe grain, or two Veganin Tablets, 3–4 times a day Phenobarbitone sodium may be stituted for the caffeine in the night dose If aspirin is not well tolerated, co *phosphate, ¼ grain, or pethidine, 50 milligrams, is often useful* A 2 millili jection of the latter drug is often a valuable analgesic

Local treatment consists of heat in the form of Antiphlogistine, wax, m available, hot wool, and poultices, and rest on a padded splint Occasionally a compress of lead lotion will give still more relief Counter-irritants such as cent cantharides may be added to the Antiphlogistine, and various physical t ments such as anodal galvanism, the cautery and an erythema dosage of

bearing exercises, preferably in a warm pool or in slings in a warm gym

REITER'S SYNDROME

Reiter's syndrome—non specific urethritis, arthritis, and iritis—is very sin to the above, but its reaction to specific treatment is less certain It is prob of virus causation, but some reliable authorities believe it to be dysenteric in ori

Other specific causes of arthritis are *tuberculosis, syphilis, dysentery, typh* fever, scarlet fever, the pneumococcus, meningococcus and *Brucella abortus*

POST-DYSENTERIC ARTHRITIS

In post-dysenteric arthritis the joints seldom suppurate and in many cases lesion is peri-articular, causing an arthralgia with absence of physical signs prognosis is good and permanent deformity rarely occurs

The use of sulfasuxidine in the treatment of dysentery has probably redu *the number of cases progressing to arthritis* When it does occur the reaction sulphanilamide or sulphapyridine is usually dramatic Salicylates have no effect

TYPHOID FEVER

stitis

Any large effusion should be aspirated or any suppurating joint drained and washed out Otherwise general principles of treatment, as laid down on page 1303, should be followed

PNEUMOCOCCAL ARTHRITIS

Pneumococcal arthritis usually occurs during the second week of an untreated

MENINGOCOCCAL ARTHRITIS

e resemblance to those
nd week of the disease

SCARLET FEVER

UNDULANT OR MALTA FEVER

Both synovitis and fibrositis often occur during the relapses in this disease. The pain and effusion are likely to recur with each relapse, but permanent joint

OSTEOARTHRITIS

DEFINITION

Osteoarthritis (hypertrophic or degenerative arthritis) is a degenerative condition of one or more joints, unassociated with constitutional symptoms, anaemia or loss of weight

AETIOLOGY

There appear to be two chief factors in its causation—injury or repeated minor injuries and strains and a hereditary congenital tendency to premature aging of the

joints possibly controlled by secretions from the anterior pituitary, thyroid and

and there are usually Heberden's nodes on the dorsum of the terminal phalanges Hallux rigidus is a particular syndrome of osteoarthritis which again is often super imposed on other types of arthritis, frequently when their activity has ceased

TREATMENT

In discussing treatment it first must be realized that many patients showing advanced osteoarthritic changes on radiological examination are unaware of their condition and do not suffer pain Therefore care must be taken not to frighten the

cure of the fibrositis will often result in a symptomatic cure of the patient (for treatment *see* Fibrositis, page 1124)

With regard to the treatment of the arthritis itself, it follows from theories as to aetiology that protection of the joint or joints from further strain or injury to gether with attempts to improve the circulation and to maintain muscle power and movement, must be our fundamental aims

Relief of Undue Strain

If the arthritis involves the weight bearing joints, patients should be told to avoid becoming tired by walking long distances and particularly to avoid rough ground where they would be liable to stumble and rick a damaged joint They

by using a of a rubber instructed slings or, of muscle

Heat

Heat in the form of short wave diathermy, an electric pad, mud packs and for the periphery, wax baths and contrast bathing commencing with and finishing with heat, should be prescribed

Mobilization and Re education

Osteoarthritis leads to limitation of movement, not only of the joint affected

leads to the patient walking with a limp, and this

ment In the first place, so far as possible, free movement is restored to all other joints and the patient is shown how the body moves in walking, he is instructed in the footwork of walking, the swing of the arms, and position of the head and neck Following the application of heat by short-wave diathermy or other means, muscle spasm in the muscles about the hip joint is relaxed by massage, active exercises with the limb supported in order not to overtire wasted muscles, and passive movement of the hip joint combined with traction The purpose of all these manoeuvres is to increase the range of movement in the hip joint. By active exercises and faradism, wasted muscles are improved in tone and nutrition As improvement takes place as a result of this treatment, the patient is instructed how to walk with natural rhythm and sometimes even without a limp The habit of limping may be difficult to eradicate even when free movement is restored to a hip joint in an early case of osteoarthritis The treatment described above is of value in the treatment of any joint in which there is restricted movement without active inflammation It is carried out at intervals at least 3 times a week for 6–8 weeks at a time

X-RAYS

X-ray treatment is helpful in some cases to reduce pain, usually 4–8 treatments spaced out over 2–4 weeks, using a fairly soft ray, will suffice

INJECTION OF JOINT

Injection of the joint with lactic acid and procaine or acid sodium phosphate has certainly a value in some cases, both reducing pain and increasing mobility Some 5–20 millilitres, according to the size of the joint, are used and if the solution [illegible]

the hot solution, (e) counter-irritants, such as Scott's dressing applied till the skin is red or itching, followed by Iodex spread on lint

SURGICAL

Finally, surgical treatment may be indicated In osteoarthritis of the hip the choice may lie between the fitting of a caliper to be worn indefinitely, an arthrodesis, an arthroplasty or occasionally an osteotomy Cup arthroplasties are giving very good results and improved technique is making this operation justifiable in some [illegible]

be advised

Silberberg, M (1949) Paper read at *Int Congr Rheum Dis N Y*
Stecher, R. (1949) Paper read at *Int Congr. Rheum Dis N Y.*

RHEUMATOID ARTHRITIS

INTRODUCTION

Rheumatoid arthritis may be defined as a generalized condition of *unknown* aetiology affecting all the mesodermal tissues of the body It is usually as o ed

a u ca y syn | tom

Frequently included in this syndrome are Still s disease (probably a *juvenile*

ance of females less symmetry of involvement of joints sometimes a more acute onset a more rapid variation in the sedimentation rate and usually a better prog nosis if a focus of infection is present and can be eliminated It is this last factor which makes this subdivision of practical importance from the point of view of

is a severe generalized disease subject to spontaneous remission and of whose aetiology very little is known It therefore follows that the patient must be treated as a whole and as an individual and by all the methods applicable to the particular case

CORTISONE AND ACTH

A new approach to the treatment of rheumatoid arthritis has come from the Mayo Clinic at Rochester (Hench and his colleagues 1949) Remarkable recovery of patients suffering from rheumatoid arthritis has been achieved by the daily intramuscular injection of 75–200 milligrams of cortisone (Kendall s compound E 17 hydroxy 11 dehydrocorticosterone) a hormone produced by the adrenal glands The administration of this substance has produced a dramatic remission of the disease The duration of the illness in patients who have been treated has varied from a few months to many years Muscular and art cular stiffness improved within 24 hours and this was soon followed by loss of articular pain and tenderness Joint swellings became less and 90 per cent had disappeared within 7 10 days Deformities due to spasm were relieved There was improvement

cured and finally the sedimentation rate became normal this being the last s gn of the disease to disappear Within seven days of cessation of treatment there was however a relapse in the majority of cases the deterioration amounting to about 70 per cent of the gain

An exactly similar remission in rheumatoid arthritis has been produced by the use of the adrenocorticotrophic hormone of the anterior pituitary (ACTH) This compound also however is in very short supply and many samples are either

inactive or so contaminated by pitressin and impurities that rise in blood pressure, *faintness and vomiting are not infrequent* (*With recent improvement in the preparation of ACTH these undesirable effects are less frequent*) The effective daily dosage of ACTH is slightly less than that of cortisone, but owing to its more

and amenorrhea *have occurred in a few cases, but all such symptoms have disappeared* at once on stopping the treatment Reports of delayed healing or even breaking down of wounds during treatment, have, however, been recorded and prolonged treatment may produce a temporary subhormonal phase on its withdrawal

Sufficient supplies of either cortisone or ACTH for general use are unlikely to be available for some considerable time, *but the discovery of their action has thrown*

TREATMENT

General

First, rest, mental and physical, general and local, is of paramount importance. In all cases, this rest is as essential as it is in pulmonary tuberculosis, and it is especially indicated when shock, worry and fatigue have been the major factors in causing the onset of the disease An initial period of rest in bed away from worry, which in a particular case may mean away from home, is most necessary

markedly beneficial effect on the general health of the patient. Analgesics to promote relaxation and sleep are indicated A mixture containing aspirin, 10

twice-weekly injections of Collosol Calcium (2 millilitres) should be given Penicillin and the sulphonamides are useless in the treatment of true rheumatoid arthritis.

RHEUMATOID ARTHRITIS

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Frequently included in this syndrome are Still's disease (probably a juvenile form of rheumatoid arthritis), the end-result of certain cases of specific arthritis psoriatic arthritis, and sometimes "climacteric arthritis" Again, many authors will subdivide the main group of typical "rheumatoids" into idiopathic cases who are most frequently women and who give no history or evidence of infection, and into non-specific infective or focal cases In the latter group there is less predominance of females, less symmetry of involvement of joints, sometimes a more acute onset, a more rapid variation in the sedimentation rate, and usually a better prognosis if a focus of infection is present and can be eliminated It is this last factor which makes this subdivision of practical importance from the point of view of

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markedly beneficial effect on the general health of the patient Analgesics to promote relaxation and sleep are indicated A mixture containing aspirin, 10

twice-weekly injections of Collosol Calcium (2 millilitres) should be given. Penicillin and the sulphonamides are useless in the treatment of true rheumatoid arthritis.

SPECIFIC

Septic foci

Any gross sepsis, especially of the "focal" type, should be eliminated The history should be carefully investigated in respect of infections occurring during the few months preceding the onset of the arthritis The teeth should be examined radiologically; a tooth should not be removed, however, unless there is definite evidence of infection, and not more than one should be extracted at a time, at all events in the first instance When, after careful removal and fixation of the crown in wax, a culture of the same organism can be obtained from a number of points on the root, and when the patient shows a reaction to the extraction, an autogenous vaccine should be prepared in high dilution, for example, 100,000 organisms to the millilitre If there is clinical progress for a time, followed by a phase in which the condition becomes stationary, the vaccine should be used (*see* Vaccine Therapy, page 50) The routine use of vaccine is to be deprecated

In some cases the tonsils, antra, gall bladder, appendix or genito urinary system may require specialist examination and opinion The objective is, in the first place, to discover the presence of infection in these organs and to form opinion as to its degree and the part it is probably playing in the arthritis in the particular case, in the second place, whenever possible to isolate the infecting micro-organism and to determine its sensitivity to penicillin and to three chosen sulphonamides On this

medical practitioner in charge of the case, because they depend so much on the condition of the patient, and on the severity and phase of his disease.

Vaccines

Apart from the use of an autogenous vaccine as outlined above, vaccines are employed as a non specific "alterative" or, by virtue of their effect in raising the general antibody titre of the blood, where no specific infection can be discovered Though improvement occurs in some cases, it is doubtful whether the percentage improved is greater than that which can be accounted for by virtue of natural remission One thing, however, is certain if benefit cannot be obtained by small dosage, no good will accrue from larger ones ... gold produces

... ly

treatments, this is varied up or down according to whether there is any reac... nd whether or not the patient is improving The ideal reaction is probably a transient but slight increase in pain or stiffness, lasting not more than 24–36 hours, unassociated with a rise of more than half a degree in the temperature, and followed by improvement

Aurotherapy

Gold is by far the most valuable form of drug therapy, but should only be used after a preliminary period of rest and treatment on the general lines indicated and when the presence of activity is indicated by a raised sedimentation rate

Progressive or severe renal or liver damage and the presence of eczema are contra-

(Auro-calcium), are the preparations most used, and the dosage employed is much smaller than it was some years ago One millilitre of Collosol Calcium given by injection at the same time seems to reduce the incidence of toxic reactions The onset of dermatitis albuminuria, or blood in the urine, stomatitis, severe joint reactions with fever, colitis or severe leucopenia (a fall in the white cell count below 4,000, affecting mainly the granulocytes) is an indication for stopping the drug Provided that such toxic reactions do not occur, an average course of Auro-calcium could be planned on the following lines, giving weekly injections 0 01 gramme, 3 doses, 0 025 gramme, 3 doses, 0 05 gramme, 18 doses—total 1 005 gramme Many clinicians are following the American lead and instead of terminating the course at 1 0 gramme, continue the injections, but the intervals between them are increased to 2 and then 4 weeks Lately there is a tendency to use smaller individual doses, and some advocate commencing with 1 milligram or even 0 5 milligram of Myocrysin If there is no reaction the dose is increased to 2, then 5, and finally 50 milligrams

The use of BAL (British Antilewisite) has reduced the fear of dermatitis considerably, its effect is to inactivate the gold in the system and will often improve within a week a dermatitis of many months' duration It is given in a 5 per cent solution in oil with 10 per cent benzylbenzoate by deep intramuscular injection, and it is usual to start with 4 injections of 2 millilitres on the first day, 3 injections for the next 3 days and then 1 daily injection for 3 days Similarly, the use of penicillin to control sepsis, should there be a period of agranulocytosis, has added safety to gold treatment, and these two safeguards together with smaller but more prolonged dosage, have made disasters extremely infrequent

Sodium bismuthyltartrate

S B T (sodium bismuthyltartrate, 1 grain per millilitre) is sometimes advocated in cases which will not tolerate gold therapy It is usual to start with 0 2 millilitre and then to continue with 0 5 millilitre intramuscularly at monthly intervals for 6–12 injections Results are, however, rather disappointing

Copper

Copper can be used in patients who are very sensitive to gold At present only an intravenous preparation, Alcuprin is available in Great Britain The course consists of twice weekly injections of 0 1–0 25 gramme finishing with a total of 2·5 grammes An intramuscular preparation is however just appearing on the market It is slightly less potent than the intravenous medication

PHYSICAL

suspension slings (*see* Acute Arthritis, page 1103)

For re-education of the circulation, contrast heat and cold is employed, followed by a good rub down, the aim being to produce a feeling of "glow" and well being The temperatures required to produce this will vary with each patient and, if successful, will increase in range as the treatment progresses Counter-irritation may be applied in many ways ranging from a simple Scott's dressing or kaolin poultice containing cantharides to the cautery or an erythema dose of ultra violet light

The correction of flexion deformity in the knees is best carried out by the application of serial plasters, each being applied with the maximum amount of extension possible and being divided after 48 hours so that it can be removed daily for treatment Usually after about 10 days there has been a gain in extension of some 10 degrees and a new plaster is then put on to take up the slack Correction of deformity in the hands is more difficult, but rest-plasters combined with exercises and occupational therapy will often help, though occasionally finger traction is indicated For the shoulders, treatment in sling suspension with springs is by far the most satisfactory method of increasing abduction and rotation

X-ray therapy

X-ray treatment often reduces pain and swelling and is of value when some of the generalized activity of the condition is burnt out and when one or two joints remain swollen and painful, thus holding up orthopaedic treatment The normal dosage is 1,200–2,000 r spread over some 6 treatments applied during the course of 2–3 weeks

Hyperthermy

Hyperthermy with the Kettering machine should only be used for post gonococcal cases, and only then by the expert who is specializing in this type of treatment and who has a specially trained team Pyrotherapy, using intravenous T A B

G D KERSLEY

Hench P S, and colleagues (1949) *Proc Mayo Clin*, 24 181.
Selye, H (1949) *Brit med J*, 2, 1129
Thorn, G W (1949) *Practitioner*, 163, 355

BACKACHE

INTRODUCTION

Backache may be the result of pain referred from any of the thoracic, abdominal or pelvic organs More often the pain originates in the back itself, and it may arise from the bones, joints (especially the intervertebral discs), ligaments or myofascial

tissues It may be the result of disease or injury, deformity or faulty posture and it

with the normal shape and movements of the spine (Figs 31–33)



Fig 31

Fig 31 —Normal forward flexion of the spine Note that 90° of flexion takes place at the hip joints note how the lumbar curve becomes slightly convex merging smoothly into the dorsal curve

Fig 32 —Normal lumbar flexion is prevented by gross spasm of the sacro-spinalis muscle (lumbar portion) Note the tight lumbar spine in this case due to a ruptured lumbo-sacral disc

Fig 33 —A reversed (convex) lumbar curve In this case a large posterior protrusion of the nucleus of a lumbar intervertebral disc is preventing normal extension of the lumbar spine The patient was unable to stand any more erect than in the picture



Fig 32



Fig 33

[illegible] diagnosis of disease.

AETIOLOGY

Backache may be due to any of the following:

- Myofascial affections
  - Fibrositis, acute and chronic
  - Trauma
  - Postural strain (habitual or occupational)
  - Deformities, congenital and acquired
- *Joint and bone conditions*
  - [illegible]
  - Senile osteoporosis
  - Osteoarthritis
  - Ankylosing spondylitis
  - Fractures
  - Adhesions
  - *Pott's disease and osteomyelitis*
  - New growths
- Referred pain
  - From myofascial tissues, ligaments and joints
  - From viscera
- Psychogenic rheumatism

TREATMENT

Bearing in mind the varied aetiology of backache, certain general principles must be observed if treatment is to be successful

[illegible] *habilitation Although normal mobility of the spine is the ideal objective,* local limitation of movement is highly desirable if it prevents pain. Therefore the second rule must be never to attempt to mobilize a rigid spine before making certain that by so doing a dormant complaint will not be aggravated The third rule is that every case of persistent backache should be examined radiologically, for by this means an accurate diagnosis can often be made In considering treatment it must be remembered that the aetiology of backache is often complex, and that several factors may be responsible for it.

MYOFASCIAL AFFECTIONS

Fibrositis

Acute fibrositis responds readily to treatment. *Infra-red irradiation for* 30

minutes once or twice daily followed by light massage, and exercises when muscle spasm has diminished, is usually all that is required recovery occurring in a few days Failure to procure relief suggests an incomplete or wrong diagnosis

tion of genuine focal sepsis often proves beneficial It is important to correct any postural faults, and to bear in mind that fatigue leading to postural strain is a common cause of backache, even in those who have only a slight degree of scoliosis Long standing cases of fibrositis, especially in the cervical or dorsal regions, are often markedly improved by gentle mobilization with traction, the manoeuvre presumably stretching thickened capsules or tight ligaments, and thus increasing mobility and relieving congestion in these structures

Definite indurations often respond to deep frictions, care being taken to avoid bruising the tissues When this occurs it indicates faulty technique

Trauma

The chief factor influencing rapid recovery from bruises, contusions and minor tears of muscle fibres and their aponeuroses is the *maintenance of normal spinal* mobility, or its speedy restoration In this way any haematoma or inflammatory exudation will be absorbed and the formation of adhesions prevented Radiant heat and massage, to produce relaxation, should precede active exercises Sometimes procaine injection is of value

Traumatic rupture of muscle fibres or ligaments is uncommon Injuries of this type may be recognized by the fact that muscle spasm and restriction of movement is considerably less than in the case of disc lesions

Postural strain

During childhood the forward tilt of the pelvis is always exaggerated, and in consequence lumbar lordosis is pronounced As the postural tone of the muscles increases, correction automatically takes place, that is between 4 and 10 years of age, only if it persists into adolescence is the diagnosis of lordosis justified and physical treatment called for

In adolescence an exaggerated dorsal curve, often associated with an upward

curves whether habitual or occupational, is responsible for much backache The treatment of faulty posture should begin with the correction of foot faults A common error in posture is to stand with the feet turned out and in the valgus position, with the knees squinting '

The correct adult stance is with the feet from 2 to 3 inches apart and parallel, and the body slightly inclined forward so that the body weight is equally distributed between the heels and the balls of the feet The knees are braced back, the buttock muscles contracted and the tail (as it were) is tucked in By lifting the chest, the muscles of the abdominal wall tighten, and the correct position of the head is obtained by keeping the chin down or pressing the neck back against the collar In

sitting, the buttocks are stuck out in contrast to being tucked in when standing, and this allows the trunk and neck to be comfortably held in the same position sitting as in standing. Restoration of normal posture and relief from backache may be brought about by postural exercises, assisted by infra-red irradiation and light

When backache is due to the posture adopted at work, both in the case of children

even may be necessary.

Horizontal posture.—Ill persons confined to bed are prone to develop backache

and of the latter with rest.

Deformities

Untreated functional errors in posture ultimately become fixed deformities Structural deformities are usually the result of disease (for instance rickets and poliomyelitis) or injury They may be congenital in origin It may be impossible to discover a cause for the condition

It is important that early measures should be taken to correct the deformity or to prevent its increase, otherwise pain in the back must ultimately result due to osteoarthritic changes and chronic ligamentous strain.

Kyphosis.—Treatment of this condition depends upon the cause Though persistent faulty posture may lead to structural changes, nevertheless considerable correction may be expected if postural exercises are persevered with, and pain in consequence relieved

full length spinal support is worn.

Scoliosis.—Functional scoliosis if untreated will become structural. (The word "functional" is used to describe a reversible condition, whereas a "structural" change *is irreversible.)* Other causes of scoliosis are wedge-shaped vertebrae, fibroid lung and other chest conditions, poliomyelitis, rickets and Pott's disease. It is important to remember that scoliosis may follow major lung operations if suitable breathing exercises are not carried out, and if strict attention is not given to posture.

Treatment to correct spinal curvature should be instituted directly the condition

affected side

Scoliosis secondary to poliomyelitis will tend to increase unless a suitable spinal support is worn The amount of re-education possible will depend on the degree of recovery of muscle power

It is sometimes possible to correct the deformity by applying a hinged plaster jacket A turnbuckle is incorporated in the jacket and by its means correction is gradually obtained Following this a surgical procedure such as spinal fusion may be carried out in suitable cases

Kypho-scoliosis, the result of healed spinal caries, requires a full length spinal support

Joint and Bone Conditions

Intervertebral disc lesions

Though disc lesions frequently recur, this tendency can be largely eliminated by early diagnosis and adequate conservative treatment By early treatment it is possible for the tear in the annulus to heal completely and for unpleasant sequelae such as sciatica or brachial neuritis to be avoided Early diagnosis is therefore essential It is important also to bear in mind that the lesion has no age limit and

should be directed towards assisting this process

Lumbar region—Minor lesions often recover spontaneously, the patient not requiring to seek medical advice, but unfortunately the relapse rate is high as insufficient time is allowed for the lesion to heal and through ignorance those very actions which caused the lesion are repeated

The average attack of acute lumbago, due to a disc lesion, usually does well, recovering in 3–6 weeks if the patient rests completely and is treated with suitable physical methods, such as short wave therapy or infra red irradiation to relieve

range of lumbar flexion returns spontaneously

The really severe attack of lumbago due to a disc lesion, which completely incapacitates the patient, and the less severe attack which fails to respond to the measures described above, require more intensive treatment This consists of com-

course of a few days The jacket should be applied with the patient standing in the position of greatest comfort, no attempt being made to correct the posture Anteriorly the jacket extends from the xiphisternum to the pubis, being cut away at the groins so that the patient can sit down, posteriorly it extends from the inferior angles of the scapulae to the coccyx

The plaster jacket should be worn for 6–8 weeks to allow satisfactory repair of

was heavy, the patient should be advised to seek lighter employment Lumbar flexion does not always return completely, due to fibrosis at the site of the lesion and in the ligamenta flava, but in course of time Nature compensates for the lumbar stiffness by increasing the hip flexion

Few lumbar disc lesions, whether the result of injury or degeneration, fail to

accepted Attempts to mobilize the lumbar spine will only lead to increased pain A well-fitting corset or brace will usually afford considerable relief A suitable

facturers of orthopaedic appliances

It may seem that this scheme of treatment is too conservative, but the rationale has a sound physiological basis and it almost completely eliminates chronic backache from the physiotherapy department

Indications for operation—If disc lesions are treated on these lines surgical intervention will seldom be necessary Laminectomy should be reserved for cases in which crural pain persists, or shows no improvement, at the end of 6 weeks' adequate conservative treatment, especially in the presence of altered reflexes, paraesthesiae and muscle wasting Severe persistent or recurrent backache, due to a disc lesion, which does not respond to conservative treatment, is also an indication for laminectomy

Epidural injection—The epidural injection of 50 millilitres of 0 5 per cent procaine in saline solution often produces complete temporary relief of the pain of acute lumbago Sometimes effective in the treatment of sciatic pain, its results are

ierable relief is sometimes
tenderness is ascer-
ine solution are
, and movement

increased

Manipulation—In pre-war days, when the symptoms of a lumbar disc lesion were attributed to "sacro-iliac strain" or lumbar adhesions, manipulation with or

without anaesthesia was the general practice Though the condition was often apparently relieved by this method of treatment relapse was fairly common and in many cases the symptoms were aggravated

Now that an important cause of lumbago in terms of a disc lesion is better under-

nor unduly flexed

Traction applied to the neck, by the head suspension apparatus, is advisable for the case which is not relieved by these measures Treatment is carried out with the patient sitting on a low stool, sufficient traction being applied to just take the body-weight off the buttocks, the duration of suspension being increased from 1 to 5 minutes, and performed daily The object of treatment is to allow disc protrusions or subluxations to reduce, and is usually successful If protective muscle spasm is so severe that treatment by the head suspension apparatus is impossible, mobilization with traction carried out under anaesthesia may be necessary

If all these measures fail, complete rest in bed or immobilization in plaster is indicated and will almost certainly be effective, but it may be necessary for the

cases recover with treatment by infra red irradiation or short-wave therapy followed by massage and progressive exercises In contrast with lumbar lesions, mobilization with traction is often effective in resistant cases It is more efficacious if preceded by procaine infiltration into the area of maximum tenderness

Osteochondritis (Scheuermann's disease)

occupation must be considered from the point of view of posture at work, and any work that involves lifting or carrying heavy weights should be prohibited

Spondylolisthesis

Often the result of non fusion of the laminae with the pedicles this condi usually occurs at the lumbo sacral joint As a rule the upper vertebra is displa forwards on the lower, but occasionally the displacement is backwards P results from distortion of the intervertebral disc and ligamentous strain The pai sometimes acute and it may have a sciatic distribution Symptoms as a ru are relieved by a well fitting brace Occasionally spinal fusion may be necessa

Senile osteoporosis

one or more vertebrae collapse Treatment consists in postural correction medi tion with vitamins A and D, and calcium, and ultra violet irradiation by the carb arc lamp and in extreme cases a spinal support (*see* page 128)

Osteoarthritis

This is a frequent cause of backache the pain originating in the periarticu structures especially in the ligaments Treatment varies with the cause of the co dition If due to degeneration of one or more intervertebral discs, treatme should be on conservative lines such measures as short wave therapy or infra r irradiation massage and rest being employed In the lumbar region a suitab brace may be necessary Vigorous active exercises may aggravate the symptoms

Conversely if faulty posture is responsible for the arthritis a scheme of postur exercises will improve the spinal mechanics and relieve the pain It must be remem bered however that in the lumbar region posture is frequently *protective* rather than faulty Differentiation is simple If the lordosis corrects easily the posture is faulty if correction is impossible the posture is either protective o indicative of a healed disc lesion

or its articula uch an injur to the latte e not be too

Osteochondritis leads to osteoarthritis Adequate treatment of senile disease during *adolescence will prevent or limit the development of degenerative* changes Similarly, untreated deformities will most certainly be followed by osteo arthritis Adequate correction by exercises or spinal brace as soon as the condition becomes apparent will limit the extent of the bony changes

Pain in the back due to osteoarthritis sometimes persists in spite of prolonged physiotherapy and root pain may develop Complete rest in bed is then essential and this usually alleviates the symptoms Alternatively immobilization in a plaster bed or plaster jacket is equally effective *If all these measures fail* a course of deep x ray therapy sometimes brings relief

and this may result in fibrous tissue formation Further, *in any case in which there is* persistent muscle spasm, whether due to injury, deformity or disease, there is a *tendency to the development of shortened myofascial strands of connective tissue* which limit movement, and in their effect amount to adhesions The limitation of movement thus imposed on the intervertebral joints may be relieved by their mobilization *provided that the aetiological factor is no longer operative*

Manipulation —Before mobilization *of the intervertebral joints, including sacro-* ... Thus the presence

... *carried out as a matter of routine to exclude neoplasm, whether primary or second*ary, as also with a view to determining or excluding other organic diseases such as Pott's disease, osteomyelitis, ankoylsing spondylitis and osteoarthritis Osteoarthritis does not necessarily contra-indicate mobilization, but its presence necessitates extra care in carrying out the procedure Furthermore, the results of *manipulative treatment are generally disappointing in asthenic states, that is to say* ... sub

Mobilization is best conducted by gentle manipulations without ... These treatments are given once or twice weekly and they may be extremely effec*tive in expert hands for a variety of conditions, especially when, as already said,* there is a past history of injury In the cervical region, occipital headaches and pain of ligamentous or capsular origin frequently respond to this form of treatment, and the method has its use in the case of cervical disc lesions which fail to respond to more conservative measures

In like manner dorsal pain is often completely relieved by *mobilization with* traction, the intervertebral and costo-vertebral joints being mobilized, their capsules stretched and movement increased

Considerable judgment is necessary as to when to manipulate the lumbar spine and except in experienced hands disc lesions are a contra indication to mobilization Pain which persists after a disc lesion has clinically healed, *and may* be presumed to result from adhesions, sometimes responds to a course of gentle manipulations The rule should be little and often, and no undue force should be *used Similar treatment is effective for adhesions* following myofascial injuries No medical practitioner should attempt mobilization of the spine without previous instruction in the technique or without previous detailed *examination of the case* as already advised

Pott's disease and osteomyelitis

During the active stage these diseases are the province of the orthopaedic surgeon After the lesion has healed a brace must be worn for a considerable period

New growths

Occasionally primary and secondary new growths involving the vertebrae are radio-sensitive Recalcification of the affected vertebra and relief of symptoms may follow deep x-ray therapy (*see* page 1387), and it is sometimes possible to prolong life in comparative comfort, for a year or more

When the condition is secondary to cancer of the prostate, stilboestrol in large doses produces rapid remission of the symptoms but is not curative, absorption of bone continuing (*see* page 138) In consequence a spinal support is necessary to prevent vertebral collapse

REFERRED PAIN

Arising from myofascial tissues, ligaments and joints

Any of the conditions enumerated above may give rise to pain of the "referred" type, as for instance pain referred to the lower extremities Present-day practice, in the absence of contra indications, is infiltration of the focal point with 2–10 millilitres of 1 per cent procaine solution, followed by deep frictions and mobilizing exercises, or occasionally by a gentle manipulation Deep pressure over the trigger spot accentuates the whole area of pain, thus providing an accurate method of location

Arising from viscera

Backache due to visceral disease, whether intrathoracic, abdominal or pelvic, will be relieved by treatment of the primary cause When the primary cause is not remediable, symptomatic treatment may be effective, or at least may mitigate the symptoms, especially in the presence of aggravating conditions such as postural strain, kyphosis, lordosis or scoliosis Symptomatic treatment on the lines already described for such conditions may be helpful, namely heat in its various forms, massage, exercises and even mobilization when it is not contra-indicated by the nature of the primary disease Medicinal treatment is with aspirin, with aspirin and phenacetin, or with aspirin, phenacetin and codeine

PSYCHOGENIC RHEUMATISM

Pain in the back may be a psychosomatic symptom Whereas curative treatment probably depends on the recognition and resolution of the emotional disturbance, it is important to bear in mind that other factors such as chronic fatigue or subnutrition may be the determining cause of the pain By the treatment of such determining factors, together with a simple explanation to the patient of the physiopathology of his backache in terms of ligamentous strain due to muscle [illegible]

E. J CRISP

Crisp, F J (1945) *Lancet* 2 422

FIBROSITIS

AETIOLOGY

Fibrositic pain may be defined as pain of unknown cause originating in the fibrous tissues of the body Fibrositis is, therefore, a syndrome rather than a disease, being probably of multiple pathology

Specific inflammatory causation (Stockman's theory) is now thought to be rare The common causes of such pain are probably (a) a localized area of muscle spasm, often reflex in origin (Elliott, 1944), (b) oedema of lobules of fat (Copeman and Ackerman, 1944), (c) psychosomatic, and (d) perhaps traumatic

Again, as fibrous tissue is found all over the body, so may fibrositis occur in

TREATMENT

Relief of pain

are often most effective, but in some cases infiltration with a local anaesthetic

ployed When the acute phase is past, aspirin, 10–15 grains, or aspirin together *with phenobarbitone, ½–1 grain given at bedtime, and aspirin,* 10 grains, with caffeine citrate, 5 grains, given on waking is helpful in many cases

Septic foci

Elimination of sepsis plays a definite but limited part in treatment, a few cases *reacting dramatically to removal of a septic focus* Vaccines are occasionally helpful (*see* Rheumatoid Arthritis, page 1110)

Strains, fatigue and local chilling

These are the commonest causes of an acute attack and should be avoided as much as possible in any fibrositic subject

n the main stand by in
ole Deep heat such as
icrease pain during the
ere is a perineuritis or
pressure on a sensory nerve Douche massage is very useful where fibrositis is widespread because a large area can be covered and the warmth of the water aids relaxation and improves the circulation

Sprays and bathing

Contrast bathing and douching are of great value in re-educating the peripheral circulation, as most patients with fibrositis are frigo-sensitive The temperatures must be varied to produce a tonic reaction as described under the treatment of Rheumatoid Arthritis (*see* page 1109)

Spa treatment

In addition to providing these hydrotherapy facilities, spa treatment is of value in giving the patient a new environment removed from business and home worries. This is particularly valuable when there is a psychosomatic factor in the disease, as is so often the case

should follow the bath and precede the exercises

Local anaesthesia

Infiltration with a local anaesthetic, as advocated by Kellgren (1941), is curative in many cases, provided that the correct site is selected for the injection and that the needle is passed in several directions from the point of puncture and is followed by deep friction and mobilizing exercises The amount required ranges from 2 to 10 millilitres of 1 per cent procaine hydrochloride or Novutox Pain, if

a larger area, often also tender and usually peripheral and slightly lower than the point requiring treatment

G D KERSLEY

Copeman W S C, and Ackerman W L. (1944) *Quart J Med*, 13 34
Elliott F A (1944) *Lancet* 1, 47
Kellgren J H (1941) *Lancet* 1 561

GOUT

Gout is a disease which is apt to occur in families, although it often arises spontaneously It is associated in some unknown way with the metabolism of uric acid *The condition may be acute or chronic Treatment is needed (1) to prevent the onset* of attacks in patients who are liable to gout (2) to relieve the pain of the acute attack, which pain may be very severe indeed, to cut short the attack, and to enable the joint to recover without serious injury, and (3) to undo the damage which may occur after repeated attacks of gout which have been incorrectly diagnosed and treated with the result that the joints have become grossly damaged

PROPHYLAXIS

Patients who are liable to attacks of gout usually have more than 3 5 milligrams of uric acid per 100 millilitres of blood before the attack, *though it may be less* immediately afterwards If they are given extra amounts of uric acid either intravenously or in the form of purine rich foods, they excrete the uric acid more slowly than do healthy people It has been found that attacks of gout may occur soon after foods rich in purines have been eaten, and for this reason patients are advised to avoid certain foods The purine n trogen content [illegible]
Foods which contain m [illegible]
(3½ ounces) should nev [illegible]
grams of purine nitrog [illegible]
amounts Thus 1 ounc [illegible]
instead of the usual meat ration but not as an addition Foods containing less than 100 milligrams of purine nitrogen per 100 grammes may be taken in ordinary amounts since 2 ounces of mutton will supply 36 milligrams only Tea, coffee and cocoa contain methyl purines and were formerly forbidden, together with all kinds of meat and fish nowadays they are allowed in moderation since it was found that patients rarely observed the rules when the diet was so strict Alcohol by itself does not seem to play any direct part in the causation of gout since it rarely occurs

TABLE

THE PURINE CONTENT OF VARIOUS FOODS (MCCANCE AND WIDDOWSON 1940)

Material (all cooked)	Purine nitrogen per 100 grammes of edible food
	grammes
Brains	0 033
Mutton (general average)	0 063
Fish	0 065
Pork	0 069
Beef	0 081
Birds	0 094
Hearts	0 116
Cod s roe (hard)	0 120
Livers and kidneys	0 140
Herring (no roes)	0 150
Smelts	0 168
Sprats	0 180
Sardines	0 234
Whitebait	0 323
Throatbreads sweetbreads etc	0 426
Herring roe (soft)	0 480

among spirit drinkers The various ingredients which give the flavour or bouquet to the red wines and champagne and all malt liquors seem to play a part in causing the attack and should be avoided The white wines (except champagne) and cider can usually be taken in moderation without any ill effects Attacks may be precipitated by injuries or other illnesses and any form of focal sepsis should be eradicated if possible

The drugs which prevent further attacks are described on page 1128

TREATMENT

Acute Attack

The acute attack is best treated with colchicum, which has a specific effect It does not increase the output of uric acid and its mode of action is not understood It may be given either as the tincture or as the wine It is always given in an alkaline solution and often combined with sodium salicylate

Tincture of colchicum	15–20 min	1 0–1 2 ml
(*or* Colchicum wine	30 min	2 ml)
Sodium bicarbonate *or* Magnesium carbonate	10 gr	0 6 g
Sodium salicylate	15 gr	1 0 g
Chloroform water to	½ fl oz.	15 ml

The active principle colchicine, $\frac{1}{60}$ grain, combined with sugar as a tablet or pill, is also efficacious, but aspirin, 15 grains, should be taken at the same time The colchicum should be taken every 4 hours as soon as possible after the onset of the attack A patient who has had a previous attack should always have either a colchicum mixture or colchicine pills at hand, since the sooner the treatment is started, the sooner the attack will be cut short, and the less will be the damage to the joint

the majority are quite unaffected
the acute attack lasts but it shou
has occurred If the colchicum
page 1128) should be given in full doses

An alternative treatment for the acute attack is lithium ionization A thick pad, soaked in a lithium salt, namely, a 1 per cent solution of the chloride or citrate, is generally used The pad is wrapped round the affected joint and the positive electrode is connected with the pad by means of a sheet of metal, chain mail or by

in
or

Local Treatment

If the attack is severe and if fever is present the patient should be in bed, and the weight of the bed-clothes should be supported on a cradle The affected joint should be covered with lint soaked in cold lotio plumbi solution and covered with or without a small piece of oiled silk The dressing should not be covered with cotton wool because this will prevent the evaporation of the fluid which evaporation helps to

make the joint less hot If the joint is very painful the lotion should be ice-cold and should be changed frequently, every 1–4 hours

The following lotion may be used as an alternative

Strong solution of lead subacetate	*10 min*	0 6 ml
Tincture of opium	30 min	2 0 ml
Distilled water to	1 oz	15 g

PREVENTION OF FURTHER ATTACKS

Once a patient has had a definite attack he is liable to have another one, though this may not occur for a year or more He should adhere to the dietetic rules already described The blood uric acid may be normal after the attack and, if so it

Chemotherapy

When the blood uric acid rises above 3 5 milligrams per 100 millilitres, further steps should be taken It is important to increase the output of uric acid in the urine and so to prevent its accumulation in the blood and tissues Three groups of drugs have this property salicylates, glycine and the phenyl carboxylic acid group of which cinchophen (Atophan, Agotan, Phenoquin and Quinophan) is the best known member

and glycine are not tolerated

Salicylates —These drugs cause an increased excretion of uric acid and Jennings (1937) found that 80 grains of sodium salicylate caused as good an excretion as 45

45 grains of sodium

ce sodium salicylate

without some symptoms of salicylism, but aspirin is better tolerated However,

pirin seems

given with

advantage

Glycine —This amino acid causes an increased excretion of uric acid which is believed to be due to the failure of the kidney to reabsorb the uric acid, since it has been shown that the excretion of creatinine is quite unaffected by the glycine (Friedman, 1947)

Combined treatment —It has been found that when glycine and salicylates are given together the effect is greater than when either is given separately and that the dose of salicylates can be decreased The dose suggested is 20 grains of aspirin and 14 grains of glycine 3 times a day

drug has been tolerated, it is given with water 3 times daily 3 days in succession each week. Sodium bicarbonate, 15–20 grains is given with water 3 times daily before food on the days the patient takes cinchophen

decreased to re accumulate in the blood and the next course again causes a good excretion The uric acid which is excreted in the urine must come from the body

great reduction in the deposits

The initial course should be of 3 days' duration, but it is usually possible after some weeks to decrease the course to 2 days or 1 day each week, and later on to 1 day a month But at the first twinge of gout the full course should be restarted

Estimations of the blood uric acid are of great value in treatment It should be

tion of 2 days or 1 day

If the dietetic restrictions and the medication are persevered with the patient should be free from further attacks, or at the worst the attack will be very mild

CHRONIC GOUT

Severe crippling, of the joints of the hands especially, may occur under the following conditions

(1) When the gout is very severe and starts in people under the age of 30 years,

(2) when inadequate doses of colchicum are given because the patient cannot tolerate the drug,

(3) when prophylactic treatment by restriction of the diet and type of alcohol is not carried out, and

(4) when the correct diagnosis is not made The condition may be diagnosed as rheumatoid arthritis and does not respond to the appropriate treatment

Under these conditions the sodium biurate is deposited in the subcutaneous tissues, along the tendon sheath and in the bones After repeated attacks these deposits may be so great that the skin may rupture, allowing the sodium biurate to escape, and the bones in rare cases may actually break When the condition is

swelling of the fingers will gradually decrease in size and the range of movement of the joints will slowly increase This severe condition can be considerably improved by lithium ionization

not be taken when an acute attack is impending

GEORGE GRAHAM

The Chemical Composition of Food

SPONDYLITIS

Arthritis of the spine is of two main types, osteoarthritic and ankylosing Th former is similar to osteoarthritis elsewhere, being associated with strain, old in juries and juvenile and congenital abnormalities, and probably also with a hered tary predisposition Spondylitis ankylopoietica is more allied to rheumatoid arthriti affecting young people and causing constitutional symptoms, namely loss of weigh anaemia, a raised sedimentation rate and often fever, but differing from rheumatoi arthritis in that the sex distribution is predominantly male rather than female an in its response to x-ray therapy rather than to gold

Osteoarthritic spondylitis therefore calls for treatment of coincident fibrositi and protection from trauma, perhaps the wearing of a support, for strengthening exercises and heat (*see* Osteoarthritis, page 1106)

Spondylitis ankylopoietica, however, requires energetic treatment directed to the general health of the individual, rest, corrective exercises and x-ray therapy

GENERAL TREATMENT

An initial period of rest in bed is generally advisable In severe cases the patient lies in a plaster bed Postural, corrective and breathing exercises are carried out first in bed and later with advantage in a warm pool if one is available These exer cises are highly important and they should be continued after the patient has returned home When maximal correction has been obtained a brace is fitted (for further details of treatment, *see* Rheumatoid Arthritis, page 1109)

THE BRACE

The essentials of the brace usually advised are a foundation of strips of duralumin ... he crests of the

fairly tightly to the brace lower down on the same side—they should not cross front of the chest A triangular or heart-shaped abdominal pad is buckled in fairly firmly below, and there is an oblique strap from higher up the brace on each side inserted into the lower third of this pad to give it an upward lift The purpose of the brace is to act as a check to increasing deformity, the shoulder-straps then

cutting into the patient and warning him that it is time for him to rest It supports the sacro-iliac region, and the abdominal pad increases the intra-abdominal pressure and aids respiratory movement

X-RAY TREATMENT

The use of x-ray is the nearest thing to a specific treatment in ankylosing spondylitis It not only eases pain, but appears to have a general effect on the constitution, often causing a fall in the sedimentation rate Three techniques are used, but equally good results seem to be obtained from a soft ray, in moderate dosage to the whole spine, as from intensive treatment which may cause unpleasant symptoms, includ-

peutists are now using a much smaller dose of x-rays, even as little as 150 r per field, and appear to get good results Control series are being followed up to determine the lowest adequate dose of x-rays

MEDICAL TREATMENT

Patients suffering from spondylitis are subject to severe pain which may be a constant dull ache or a severe root pain Every effort should be made to relieve the patient because pain has a very weakening effect, leading especially to loss of appetite, interference with sleep, loss of weight and depression The pain will

iodine and gold is of doubtful value in ankylosing spondylitis In the author's experience vaccine treatment is of no value

REMOVAL OF SEPTIC FOCI

The aetiology of spondylitis is so obscure that treatment under this heading cannot be undertaken on the basis of removing the cause of the disease. At the same time severe chronic sepsis may be a debilitating factor and in some cases improvement follows the removal of grossly infected teeth and chronically infected tonsils, or the treatment of a chronically infected antrum containing pus In fact, in ankylosing spondylitis the removal of chronic sepsis is a part of the general treatment which has for its object the improvement of the patient's health and strength by all means that are available

CERVICAL ARTHRITIS

In cases in which the neck is affected very severe deform

G D KERSLEY

SKIN DISEASES

ACNE VULGARIS

Acne vulgaris is an affection of the pilo-sebaceous follicles, *arising mainly in* adolescents and young adults, in which the primary lesion is a hyperkeratosis of the follicular orifice combined with hypersecretion of the sebaceous glands. The pathology is obscure but is thought to be related to an endocrine imbalance with a tendency to excess of androgenic over oestrogenic hormone The condition is often associated with the seborrhoeic state All degrees of severity occur and in the milder cases treatment based on general hygienic principles alone is indicated, unless the patient, as is often the case, is obsessed with the spots and prone to manipulate them

PREVENTION AND GENERAL TREATMENT

In the absence of knowledge as to the aetiology, certain principles only can be put forward for prevention A balanced diet, with avoidance of excess of carbo hydrates and fats, and with adequate first-class protein and a comprehensive vitamin content, combined with the normal stimuli to the skin from exposure to all types of weather, with open-air exercise and the use of enough soap and water, should enable the milder cases to be kept within control

In diagnosis the exclusion of bromidism and iodism is essential, particularly in cases without comedones and with much pustulation

It should be remembered that drugs, such as aspirin and phenobarbitone, may aggravate acne *At the same time, the possibility of external agents, both as causal* and as exacerbating factors, must be considered, particularly oils, pitch and tar

ADJUSTMENT OF DIET

Each patient must be studied widely from the endocrine, dietetic, general hygienic, and psychological points of view The diet should be adjusted when necessary by reducing the carbohydrates and fats and increasing protein An ex cessive intake of salt is inadvisable chocolate and cocoa should be forbidden and fried food and sweets reduced The control of constipation by dietetic and other

[illegible]

and B_6

ENDOCRINE FACTORS

Each patient with acne should also be studied from the endocrine aspect and if there is evidence in a female of masculine tendencies, shown by male type of dis tribution of pubic hair and somewhat masculine contours with hypertrichosis, or if in the male the masculinity seems excessive, oestrogen therapy, both oral and local, is more likely to help In young women a dose of Dienoestrol, 0 3 milli gram twice a day for 10 days, starting from the last day of menstruation, may be

following form

Stilboestrol	1 gr	60 mg
Emulgent base to	1 oz.	30 g

In severe cases in males, a crystal of oestradiol may be implanted subcutaneously but the unavoidable and possibly dangerous changes in the secondary sexual characteristics that are likely to occur should be explained to the patient (or his parents) beforehand

In addition to oestrogens thyroid extract is often found to be beneficial probably from its stimulating effect on metabolism, in a dose of 1 or 2 grains a day

It must be remembered that the strong physiological stimulus to the whole endocrine system resulting from normal sexual relationships often produces a favourable response and resolution of acne vulgaris Marriage may give better results than the best efforts of the physician, and the effects of pregnancy may also be beneficial

Anaemia and focal sepsis should be excluded and treated, with special attention to the teeth, tonsils and sinuses

IRRADIATION

General ultra violet ray therapy is helpful in a large proportion of cases but should be preceded by an x ray examination of the chest to exclude any latent focus of tuberculosis, the presence of which would make this treatment undesirable Exposure to natural sunlight and fresh air, with open air exercise and sea bathing and general 'weathering , are all good measures

PSYCHOLOGICAL FACTORS

In many patients psychological factors are most important in causing an aggravation of the complaint Acne sufferers tend to introspection and resentment of parental control and often confess to intense feelings of guilt which may have a

LOCAL TREATMENT

The pityriasis capitis so often related to acne must receive attention by the daily use of a lotion, such as

Mercuric chloride	½ gr	30 mg
Salicylic acid	10 gr	600 mg
Oil of rosemary	20 min	1 2 ml.
Castor oil	60 min	4 ml
Industrial methylated spirit to	1 fl oz.	30 ml

A spirit shampoo or a soapless detergent such as a 1 per cent solution of Cetavlon should also be prescribed In combing the hair, the patient should wear a towel around the neck so as to avoid the transference of scurf to the shoulders and chest

A rubber sponge may be used to produce suction when bathing the face, but indiscriminate squeezing should be discouraged and many patients need more dissuading than encouragement in manipulation The use of a comedone extractor is helpful to patients who can be trusted to use it properly As an aid to the removal of comedones, the use of an exfoliating application is desirable, such as

(a) Potassium sulphate	120 gr	8 g
Water to	1 fl oz	30 ml
(b) Zinc sulphate	120 gr	8 g
Water to	1 fl oz	30 ml

Solutions (a) and (b) should be mixed together immediately before application which should be made two or three times daily An alternative preparation is

Resorcinol	15 gr	1 g
Precipitated sulphur	15 gr	1 g
Zinc oxide	180 gr	12 g
Soft paraffin to	1 oz	30 g

The latter preparation should be applied twice daily, the amount of resorcinol and of sulphur may be increased to 30 or 60 grains per ounce, in order to produce exfoliation in resistant cases Whiteheads (milia) should be pricked with a cutting (Hagedorn) needle and their contents expressed

Pustules should not be squeezed but if they are of any size they may be incised with the point of a scalpel Fluctuant nodules of acne conglobata should be punctured with a fine tenotome or cautery and their contents expressed

Owing to the excess of sebum on the skin and the keratotic plugs in the follicles, the liberal use of soap and water is called for, and stimulation by friction is beneficial, using a rough flannel for the face and a brush or loofah for the back

Greasy applications and cosmetics should be avoided and, for day use, a "shake" lotion of calamine type, containing 2 per cent of sulphur or ichthammol, may be applied

X-ray therapy should be reserved for the worst and most intractable cases and often gives good results in exposures of 100–150 r at fortnightly intervals, for three applications, with protection of the eyes and lips

[illegible] associated with acne, many [illegible]ons tend to squeeze and ex[illegible]ne (*acné excoriée*) is easily recognizable Co-operation can best be obtained by emphasizing the risks of increasing scarring from such practice

Very little can be done for the scars caused by acne vulgaris except by cosmetic concealment, this specially applies to the sunken scars which may cause much dis[illegible] the front of the chest

Acne Nuchae

[illegible]

best results

Acne Dorsalis

Acne dorsalis is a type often related to excessive sweating and every attention must be paid to the avoidance of sweat retention in this region, either from impervious woollen underclothing or from rubber undersheeting which should only be used if this is absolutely essential

Acne Necrotica

In this variety, which particularly tends to affect the hair margins, special attention must be given to the treatment of the concomitant pityriasis capitis and the possibility must be considered of the condition being an acneform tuberculide Many of these cases fall, however, into the category of *acné excoriée* with resultant scarring The lesions of acne necrotica can often be subdued by applications of penicillin cream

Acne Conglobata

The nodular and cystic lesions in this condition tend to arise not only in the malar and nuchal regions but also on the buttocks Pus collects under the thickened integument and much disfigurement may result, with a tendency to canalization and sinus formation, and with secondary infection Surgical principles must be followed and efficient drainage provided by opening up sinuses and cutting bridges of scar tissue, combined with the use of topical penicillin for the secondary infection Two or three exposures to x-rays, 100–150 r, fortnightly, may then help resolution Benefit may result from the use of oestrogens

ALOPECIA

ALOPECIA AREATA

In this condition of unknown aetiology, circular or polycyclic bald patches appear on the scalp and beard, sometimes causing, by coalescence, total baldness

Treatment

Whenever the appearances are at all atypical and in particular when there is any *suggestion of a moth-eaten appearance, the blood Wassermann and Kahn* reactions should be carried out Alopecia areata must also be differentiated from the various types of alopecia cicatrisata, by the presence of marginal "club" hairs in the former and of scattered stumps with scarring which may be inconspicuous, in the latter. In children, microsporon infections with a minimal degree of scaling must be excluded by inspection with a lens for broken hairs, microscopic examination of these stumps and examination of the head under Wood's light The rare "black dot" [illegible]

teeth may be necessary

described under that heading

Nutritional measures are often employed empirically in this condition and vitamin B complex, with general ultra-violet radiation, seems to help regrowth in some cases Thyroid extract is regarded as a valuable remedy by some

Local treatment consists of measures to produce an erythema by an irritating lotion such as alkaline cantharidin lotion or by 1–3 per cent dithranol ointment The latter substance should be prescribed with a warning that care must be taken to prevent its access to the eyes, particularly during sleep, from the pillows The prescription for alkaline cantharidin lotion is as follows

Strong solution of ammonia	30 min	2 ml
Solution of Cantharidin (*B P C*)	30 min	2 ml
Glycerin	30 min	2 ml
Industrial methylated spirit	120 min	8 ml
Camphor water to	1 fl oz	30 ml

The increased blood supply resulting from a second degree erythema, produced weekly by ultra-violet rays, may be of great value, particularly as it entails the patient's attendance at hospital and for this reason probably has an additional suggestion value

The local application of thorium X at fortnightly intervals has been reported to hasten the regrowth of the bald patches but results are inconsistent and no rational explanation has been offered for its effects, except that it possibly succeeds by the production of an erythema or by suggestion

In anxious and nervous individuals the use of sedatives is indicated and in others a strychnine tonic If depression is apparent, amphetamine may be given in the morning In all cases it is wise to give a hopeful but guarded prognosis and if club hairs are present the patient should be warned that the condition is probably still spreading

ALOPECIA TOTALIS AND ALOPECIA UNIVERSALIS

Alopecia totalis, in which the whole scalp is affected, and alopecia universalis, in which every hair on the body may be shed, would appear to be more severe grades of the same condition but their aetiology is equally obscure and treatment is on the same lines as alopecia areata, though unfortunately often with less success For this reason it may be advisable at a comparatively early stage in these cases to recommend the wearing of a wig If emotional instability is severe, psychological treatment is called for, if necessary by a psychiatrist

ALOPECIA CICATRISATA

are, pseudo-pelade, folliculitis decalvans, and chignon alopecia

Pseudo-pelade

In pseudo-pelade, the cause of which is unknown, the onset is insidious, small atrophic bald areas develop, increase in size, and may merge into one another. The pattern thus formed has been compared to footprints in the snow There is no active inflammation, no pustulation, and if hairs bordering an active area are pulled out they have a "glassy sheath" Local treatment is useless A course of injections of gold occasionally stops the spread of the affection

Folliculitis Decalvans

This condition is characterized by the formation of irregular bald areas with a

Chignon Alopecia

Chignon alopecia occurs in middle-aged women The baldness commences at the

for the detection of the pale blue, longish fluorescent hairs associated with this condition Microscopical and cultural confirmation is necessary

SYPHILITIC ALOPECIA

In secondary syphilis the hair may fall irregularly from the scalp, causing a somewhat moth-eaten appearance The hair grows again when suitable treatment with penicillin or neoarsphenamine and bismuth is given Permanent alopecia follows gummatous ulceration of the scalp

ALOPECIA DIFFUSA

This term is used to cover all cases of diffuse thinning of the hair, with or without pityriasis capitis Most cases fall into the categories of seborrhoeic alopecia,

balanced diet containing milk and cheese, and treatment with iron, Marmite, and vitamin B complex Local and general ultra-violet therapy is advisable Occasionally weaning may be necessary Alopecia may also arise from extreme dietetic faddism or gastro-intestinal disease

If pityriasis capitis is present, the following preparation should be rubbed in

nightly The percentage of castor oil may be lowered or raised according to the oiliness or dryness of the scalp

Mercuric chloride	½ gr		30	mg
Salicylic acid	10	gr	600	mg
Oil of rosemary	20	min	1 2	ml
Castor oil	60	min	4	ml
Industrial methylated spirit to	1	fl oz	30	ml

If there is a more active seborrhoeic dermatitis of the scalp, preference may be given to the ointment given below It should be rubbed into the scalp twice daily; a 1 per cent Cetavlon shampoo should also be used

Salicylic acid	10 gr	600 mg
Precipitated sulphur	10 gr	600 mg
Emulgent base (or soft paraffin) to	*1 oz*	*30 g*

If worry and fatigue can be alleviated, the condition is likely to respond more rapidly

HYPOTHYROID ALOPECIA

This condition is recognized from the presence of other manifestations of myxoedema or cretinism, and will respond, though slowly, to thyroid extract.

SENILE ALOPECIA

This should be treated on nutritional, endocrine and local lines but the prognosis is very unfavourable

HEREDITARY PREMATURE ALOPECIA

This is often familial and of male type It is not amenable to treatment

TRAUMATIC ALOPECIA FROM COSMETIC PRACTICES

[illegible] sh
nd
nt
salicylic acid ointment used It is possible that lowered states of [illegible] he hair more susceptible to the alkalis employed in permanent waving so that, except when there has been a fault in technique, vitamin B complex should be prescribed, and calcium lactate with vitamin B may be given if a brittleness of the nails is also present

ANGIOMAS

CLASSIFICATION

Birthmarks are known as naevi They do not necessarily become *visible at birth* although the embryonal rests from which they form are present then Haemangiomas are but one form of naevus, and *may be classified thus*

- Capillary haemangiomas
  - Stellate or spider naevi
  - Port wine stain or naevus flammeus

Cavernous haemangiomas
  Superficial (strawberry marks)
  Deep
Capillary-cavernous haemangiomas

TREATMENT

Capillary Haemangiomas

The spider naevus (Naevus araneus) may be treated by electro-coagulation or by destruction of the central vessel with an electro-cautery heated to dull-red; electrolysis may be preferred In children, a local anaesthetic may be necessary

The port-wine stain is best left untreated if one has not much experience of dermatology, for its unsightliness may be aggravated by injudicious therapy Often it is best to recommend camouflage, for which purpose Covermark is the best, and Pellanthum with Leathammol is satisfactory Facilities for the individual matching of suitable cover preparations are also obtainable

Thorium X when used by an expert may give good results For the first treatment in an infant, thorium X in spirit in a strength of 500 electrostatic units per millilitre may be used, and 1,500 electrostatic units per millilitre is the strength if the patient is an adult It is necessary to produce a definite inflammatory reaction which makes the naevus much more red than before When this has completely subsided, say in about a month, probably the whole area will be somewhat less red than before treatment, though possibly somewhat pigmented, and there may be islands almost [illegible]

or no further improvement takes place

Treatment with ultra-violet rays, using the Kromayer lamp, is successful in some cases Grenz-ray treatment may be used Pale lesions are less resistant to treatment than the darker and more purple-coloured varieties

Cavernous Haemangiomas

Strawberry marks are raised or papillomatous masses, red or purple in colour In many cases, plastic surgery is the treatment of choice. In other cases, radiotherapy or carbon dioxide snow may be beneficial; but often the lesions contain much fibrous tissue and blanching of the vascular element causes the lesion to be even more unsightly.

In the case of cavernous angiomas, if the parents are not impatient, treatment is [illegible]

Carbon dioxide snow

[illegible]
wi [illegible]
sh [illegible]
repeated in 3–4 weeks, if necessary

X-ray therapy

A single application of 600 r (using factors of 0 5 millimetre aluminium, 75 kilovolts, 5 milliamperes and a focal-skin distance of 25 centimetres) will often cause retrogression in 3 months If necessary a dose of 300 r can then be given

Radium

Half strength or full strength plaques, with a filter of 2 millimetres of brass are left on the skin for 7 or 3½ hours respectively Most angiomas are cured with 2 or 3 such treatments at 3 month intervals

Radon seeds

Radon seeds may be implanted in the lesion

Sclerosing solutions

These solutions may be injected A 26-gauge needle should be used radial injections are made from a central point, placing 0 1–0 2 millilitre of the solution into each area These blanch after the injection and the drops should be injected so that the blanched areas are contiguous Sloughing may occur

CAPILLARY CAVERNOUS HAEMANGIOMAS

These may usually be treated in the same way as deep cavernous angiomas Lymphangiomas may be treated on the same lines as haemangiomas

BURNS AND SCALDS

DEFINITION

Burns arise from injury to the skin from excessive heat or cold, or from electric currents or certain chemicals Scalds arise from moist heat, usually from hot water or steam

PREVENTION

It is said that approximately 90 per cent of burns received in civil life are avoidable and 80 per cent of them occur in the home The majority of these arise from unprotected fireplaces into which children, epileptics and the aged may fall or from inadequately protected gas and electric fires which set fire to girls' and [illegible] 's and [illegible] loths grabbed in an emergency to prevent a [illegible] auses of scalds There is a great field of preventive medicine in the instruction particularly [illegible] pots and [illegible] h by not [illegible] be pulled [illegible] fant alone with any possible risk of exposure to burns and scalds Before [illegible] an infant in bath water, it is essential to test the heat with the inner side of the elbow, rather than with the finger tips The proper guarding and maintenance of all electrical equipment and electric points are also important A wide mesh guard standing away at least 2 inches from the element is desirable

Chemical burns in civilian practice most often arise from the use of mercurial dressings such as Scott's dressing, and of mustard poultices or iodine In industry there are numerous other causes, including caustic agents and phosphorus, and in war mustard gas and lewisite are causative agents

TREATMENT

The treatment of burns is a surgical problem and only general principles and local measures will be discussed here

General Principles

These principles consist of the removal of the patient from the source of the burn or the removal of the burning substance from the patient s skin, the relief of pain, thirst and loss of heat, the prevention of infection, particularly by haemolytic streptococci, causing no further damage to the skin, minimizing the loss of plasma, combating the shock of the burn with intravenous plasma or serum and appropriate high protein vitamin and calorie diet

Local Treatment

The principles of local treatment are prevention of the risk of infection or reinfection elimination of pathogenic organisms already present on and around the burn area without aggravating the damage, control of local oedema, allowance of full movement after 10 days, prevention of deformity by preparing burned areas [illegible]

[illegible]

has arisen it is better controlled by cleansing the burned skin with a 1 per cent solution of Cetavlon (cetyltrimethylammonium bromide) which is lethal to haemolytic streptococci This cleansing should be carried out in warm surroundings under full aseptic precautions

First-degree burns

The local treatment of burns depends upon the depth of the burn For burns of the first degree, resulting only in erythema and degreasing of the skin, a simple ointment such as ointment of wool alcohols or soft paraffin ointment (sterilized) is sufficient, but watch must be kept for the later development of vesiculation

Second-degree burns

Burns of the second degree, causing vesiculation in the epidermis or between the [illegible]

[illegible]

already broken they should be swabbed with gentle sweeps from the centre of the

The prevention and, for that matter, the treatment of contact dermatitis mainly depend on the discovery of the irritant or sensitizer to which the patient has been exposed When the cause is found, prevention of further risk of contact may be possible, or means may be taken to insulate the skin from the causal agent, or an innocuous substitute may be employed

TREATMENT

The treatment of dermatitis by itself is a relatively simple matter and the same general principles apply in nearly every case, no matter what the primary cause When examining a patient whose skin condition suggests the probability of a con tact dermatitis, five main groups of the condition must be borne in mind

Physical agents

active emanations, and from exposure to dust-laden, drying winds

Occupational causes

Such causes are physico-chemical, including the innumerable and ever increasing causes from industrial hazards and household detergents This form includes dermatitis produced by irritants used in hobbies and play

Dermatitis medicamentosa

reading of the spread of the condition as indicating an extension of the infection may lead to the use of stronger agents, with increasingly severe dermatitis Under this heading must also be included dermatitis from soaps and antiseptics used in the home, douches, contraceptives, eye drops, liniments, and many other applications

Dermatitis from cosmetics

... number of cases of contact dermatitis and ... om the head to the ... l by cosmetic agents of various types and for an easy mental classification it is as well to include in this group dermatitis produced by clothing and by metal and rubber fittings, such as suspender fastenings and dress protectors

Dermatitis from plants and vapours

This group, tending in the first place to a seasonal incidence, can cause much distress and difficulty in elucidation Certain vapours, especially formalin, and some industrial vapours can cause a severe dermatitis of similar type

CAUSES OF DERMATITIS IN SPECIAL AREAS

The more common causes of dermatitis in special areas are given in the following Table

TABLE—CAUSES OF DERMATITIS IN SPECIAL AREAS

Site of affect on	Common causes
Scalp	Dyes and permanent wave lotions
Forehead	Hatbands
Eyel ds	Numerous air borne substances from plants dust insecticides formalin vapour and many others Cosmetics, particularly nail varnish and cuticle removers and other cosmetics used on the hands and face such as dyes, powders and creams Eye lotions particularly those containing a sulphonamide peni cillin silver and sometimes atropine. Any irritant transferred from the hands, includ ng alkalis and numerous other agents
Face	Cosmetics soaps medicaments antiseptics air borne or hand borne agents including those met in occupations. Light sen sitization including that induced by exposure to sulphonamides, acriflavine and mercurials
Ears	Perfumes nail varnish plated earrings
Retro-auricular area	Hair dyes scents neurodermatitis particularly in young women ped culosis capitis
Lips and perioral area	Lipsticks dentures mouthwashes tooth pastes fruit juices ariboflavinos s
Neck	Dyes used on hair or fur; occupational dusts hand trans ferred agents, including nail varnish friction from clothing dusts from sacks carried on the shoulders neurodermatitis pediculosis capitis plated jewellery perfumes.
Axillae	Dyed clothing dress protectors depilatories deodorants shaving materials
Antecubital area	Clothing dusts occupational irritants neurodermatitis
Hands and forearms	Contact irritants of all grades of severity handled at work at play or casually medicaments sunl ght radioactive substances.
Trunk	Cloth ng; antiseptics wool sarcopticides and insecticides l n ments
Perianal area	Rectal discharges and threadworms local medicaments diapers clothing phenolphthalein neurodermatitis
Vulva and groins	Vaginal discharges glycosuria contraceptives and other vaginal applications and appliances hand borne irritants, in clud ng nail varnish neurodermatitis ariboflavinosis.
Penis and scrotum	Glycosuria contraceptives and preventatives antiseptics clothing; hand-conveyed agents ariboflavinosis
Thighs	Clothing; industrial oils, suspender fittings metal objects and match boxes in pockets neurodermatitis.
Legs and ankles	Industrial dusts garters and socks medicaments used on eczematous, ulcerated and traumatized areas.
Feet	Footwear antimycotics.

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Physical agents

Under this heading are included trauma to the skin from friction, including tha from clothing made of woollen or other coarse fibres from extremes of heat an cold, from exposure to infra red or ultra violet rays, or to x rays, and to radio *active emanations, and from exposure to dust laden, drying winds*

Occupational causes

Such causes are physico-chemical, including the innumerable and ever increasing causes from industrial hazards and household detergents This form include dermatitis produced by irritants used in hobbies and play

Dermatitis medicamentosa

Many cases of this type are seen at hospitals, particularly when a non infective mycotic and treated with antiseptic namides or antibiotics Further mis licating an extension of the infection ncreasingly severe dermatitis Under this heading must alsc ics used in the home, douches y other applications

Dermatitis from cosmetics

and

suspender fastenings and dress protectors

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Antecubital area	Clothing dusts occupational irritants neurodermatitis
Hands and forearms	Contact irritants of all grades of severity handled at work at play or casually medicaments sunlight radioactive substances
Trunk	Clothing antiseptics wool sarcopticides and insecticides liniments
Perianal area	Rectal discharges and threadworms local medicaments diapers clothing phenolphthalein neurodermatitis
Vulva and groins	Vaginal discharges glycosuria contraceptives and other vaginal applications and appliances hand borne irritants including nail varnish neurodermatitis ariboflavinosis
Penis and scrotum	Glycosuria contraceptives and preventatives antiseptics clothing hand-conveyed agents ariboflavinosis
Thighs	*Clothing industrial oils suspender fittings metal objects* and match boxes in pockets neurodermatitis
Legs and ankles	Industrial dusts garters and socks medicaments used on eczematous ulcerated and traumatized areas
Feet	Footwear antimycotics

Prevention

Occupational dermatitis

In the prevention of occupational dermatitis, four possibilities arise *first of* avoidance of exposure to the irritant, secondly, of the use of protective clothing and barrier creams, thirdly, of the use of non irritating substitutes, and fourthly, the selection of personnel for hazardous tasks

Desensitization against occupational irritants is not practicable, usually sensitization becomes greater rather than less on repeated exposure and the use of alternative non irritating agents is often impracticable The avoidance of exposure may be carried out by protective clothing, barrier creams or dust extractors The barrier cream should be selected for each specific hazard as care must be taken that the irritant is neither soluble in, nor miscible with the cream that is used A diminution of a risk may be obtained by lessening the humidity of the air in the workroom, as the skin is much more susceptible to dust and other irritants, particularly of a water-soluble or water miscible nature, if it is in a moist condition

As friction often plays almost as important a part as the chemical nature of the irritant, its avoidance may also help considerably in preventing industrial dermatitis

Many agents may be tolerated by an intact skin but are harmful when they gain access to the epidermis or dermis through minute fissures and abrasions For this

for this purpose, a full time nurse may often be more helpful than a part time medical officer

In all industries in which there is a risk of dermatitis the examination of new employees should include assessment of skin type and in the presence of the seborrhoeic state or xerodermia, special care should be taken to avoid exposure to industrial irritants, sufferers from acne should be protected from exposure to oils and periodical inspection of employees should be performed for the presence of minor injuries and the earliest evidences of dermatitis or states of sensitization

More and more cases of dermatitis are arising from household cleansing agents and no provision is made at present for warning the user against the risks of these powerful caustics bleaches and degreasers The use of bland greases such as lanolin or soft paraffin before and after contact with these degreasers may prevent the

rubber gloves may aggravate a dermatitis also, the patient may become sensitized to rubber

Difficulty arises if the dermatitis is produced by an irritant which the sufferer has to handle in a specialized capacity for example, procaine dermatitis in a dentist or formalin dermatitis in a pathologist There is no way of desensitizing against these substances and every attempt must be made to avoid contact or reduce it to a minimum

Dermatitis medicamentosa

In hospital practice perhaps the most common error of diagnosis noted in cases

referred for advice is that of misinterpretation of states of eczematization and

more often arises from over treatment of ulcers of the leg with antiseptics than from any other cause

Many patients are only too anxious to treat any lesions that are visible and as a result, dermatitis may start from the injudicious treatment of acne lesions with ointments of strong and complex composition containing sensitizing agents, or from unnecessary interference with a herpes simplex The resultant follicular eruption of the adjoining area may be misdiagnosed as sycosis barbae and further aggravated by antiseptic agents Unfortunately in the advertising of proprietary treatments over-emphasis is often laid on the risks of bacterial invasion through the skin and many patients are obsessed with this risk to such an extent that they use antiseptic solutions in their bath water and wash with antiseptic soaps owing to their bacteriophobia This practice may also sometimes be a manifestation of a guilt complex shown by a "Lady Macbeth like" syndrome of an attempt to cleanse the conscience by the use of antiseptic agents on the skin

Cosmetic dermatitis

The prevention of dermatitis arising from the use of cosmetics seems somewhat Utopian, particularly as this by no means only arises from the use of cheaper brands

for this highly sensitizing substance

Plant dermatitis

Plant dermatitis may be a great nuisance to the sufferer owing to the impossibility

TREATMENT

Accurate diagnosis is the first essential in the treatment of dermatitis Many

patients under a slightly warmed electric cradle On the other hand, heat loss from the skin must not be prevented by completely occlusive ointments such as soft paraffin ointment, and some comfort may be obtained with the use of bland applications such as ointment of wool alcohol or calamine liniment Oatmeal or bran

ment of fissures and sepsis, as patients with exfoliative dermatitis tend to develop severe toxaemia and even septicaemia from infections of the skin

In cases caused by gold or arsenic, British Antilewisite is of the greatest benefit,

may be repeated after a week and in the interval crude liver injections, 4 millilitres daily, should be given This treatment may be repeated in smaller dosage after the second course of BAL

The idiopathic group tends to develop as a dermatosis originally diagnosed as an eczema or as a dermatitis of obscure origin It is not very amenable to treatment

stress must not be overlooked

DERMATITIS HERPETIFORMIS

Dermatitis herpetiformis is an intensely itching eruption consisting of flaccid vesicles and excoriated and scabbed pruriginous nodules, tending to affect particularly the shoulder and pelvic girdles and external genitalia

Diagnosis

The cause is unknown, as a diagnostic test, the patient may be given potassium iodide, 5 grains, three times a day for three days An outbreak of vesicles makes it likely that the condition is dermatitis herpetiformis

Treatment

Sulphapyridine usually *acts almost as a specific in this complaint* and may be

use of this drug may be persisted in for months and even years in this dosage if monthly white cell counts are made If neutropenia develops, the drug must be *temporarily withdrawn, but this complication is not common*

All other sulphonamide preparations are inactive in this complaint and nico

In exacerbations it may be necessary to treat the patient in bed with sedatives antihistamine drugs such as Benadryl and Anthisan may be useful Halogens are contra indicated A diet low in salt content may be tried and general ultra violet irradiation may give some relief

For some patients psychiatric aid may be necessary but only too often in spite of all the efforts of the physician the patient s existence remains uncomfortable

HYPOSTATIC DERMATITIS

Hypostatic dermatitis is an inflammatory condition of the skin arising on the lower half of the calves with or without the presence of varicosities often initiated by trauma For a discussion of the factors concerned in hypostatic dermatitis the reader is referred to a text book of dermatology

Prevention

The effective treatment of varicose veins either by ligation injection or efficient

Treatment

The first essential is adequate support to the whole limb from the toes to the knee so as to prevent fluid retention and swelling A Viscopaste bandage applied either direct to the skin or over a thick layer of calamine or zinc cream provides the most innocuous support for crusted or moist erythematous areas In the later, scaly p

over a

effecti

has occurred, or in which the dermatitis is active to do this is to court the risk of sensitization dermatitis

LIGHT-SENSITIZATION DERMATITIS

Classification

In this group of eruptions in which sensitization to light occurs in all degrees of intensity, several types may be recognized, the first three of those mentioned below occur in children

(1) Hydroa vacciniforme, a vesicular and bullous eruption of exposed parts, a rare, inherited abnormality, often associated with porphyry

(2) Summer prurigo, a more common, milder form, with a polymorphic papulo vesicular, erythematous eruption, pigmentation and scarring

(3) The fortunately very rare xerodermia pigmentosum in which changes identical to chronic radiodermatitis develop owing to hypersensitivity to ultra violet rays The condition is usually fatal before adult life from carcinomatosis

(4) Acquired light sensitization dermatitis of papulo pustular and erythemato-squamous type, due to drugs, including sulphonamides quinine, barbiturates arsenicals, and acriflavine Several dyes, including eosin in lipstick, can cause sensitization to light Coal tar dan pitch, and many of their derivatives can also produce photosensitization with stimulation of epithelial proliferation Sunlight may cause or aggravate pigmentation from arsenic, bismuth, gold and silver

(5) Erythematous and bullous eruptions from sensitization to sunlight following contact with certain plant juices, including wild parsnip figs, rue, meadow grass, lime oil, and bergamot oil (phyto photo dermatitis)

(6) In lupus erythematosus, herpes simplex, urticaria pellagra and skin cancers sunlight often plays a part in the initiation or aggravation

Prevention

[illegible] they may be lessened [illegible]

light screening applications, such as one of the following

(1)	Salol	2
	Tannic acid	2
	Industrial methylated spirit	96
(2)	Tannic acid	5
	Stearin	25
	Glycerin	10
	Triethanolamine	1
	Oil of theobroma	1
	Cetyl alcohol	0 5
	Distilled water	57 5

The following is also recommended

Nutracolor	2
Titanium oxide	15
Bentonite	2 5
Glycerin	15
Rose water to	100

It must be remembered that exposure to wind also has to be avoided

be advised to avoid exposure to sunlight while taking sulphonamides by mouth

Treatment

ing tar, must be avoided

For summer prurigo and for the acquired toxic forms, the diet should be of high protein content, with the addition of proteolysed liver extract and vitamin B complex In cases associated with gastro intestinal or hepatic disorders dilute hydrochloric acid may be prescribed with meals as follows

Dilute hydrochloric acid	30 min	2 ml
Glycerin of pepsin	30 min	2 ml
Distilled water	½ fl oz	60 ml

The preparation is to be taken well diluted and with as much syrup of lemon as is required *Bacillus acidophilus* preparations or viable *B coli* cultures (Mutaflor) may have to be given if the intestinal flora is abnormal and intramuscular injections of crude liver, 4 millilitres twice or three times a week, may be prescribed with benefit If lichenification results fractional x ray exposures may prove very useful If secondary infection supervenes penicillin lotion, 1 000 units per millilitre in

NAPKIN DERMATITIS

Definition and Aetiology

An erythematous eruption in areas in contact with napkins, this condition is dealt with separately and not under the heading of Contact Dermatitis in view of the special problems concerned The causes are numerous but fall into two main groups The first type is an infective dermatitis tending to involve the depths of the flexures and creases, and often associated with moniliasis, with or without thrush in the mouth

The second and more common type is a chemical dermatitis which tends to involve the summits and not the folds Mixed cases may occur The chemical cause may be from the napkin itself or from urine or faeces The napkin may be

infants pass in their faeces urea-splitting organisms which act on the urine to produce ammonia soon after the napkin is soiled

PREVENTION

The napkins must be changed as soon as possible after they are soiled so that the skin is not macerated by long contact with urine, every care must be taken to [illegible]

TREATMENT

Infective cases should be treated with the aim of desiccating the skin and discouraging the growth of monilia and pus forming organisms The areas should be swabbed with hypertonic saline solution and a paste, such as the following *applied*

Brilliant green . .	1
Zinc paste, to . .	100

Castellani's carbol fuchsine paint may also be used, and in frankly pustular cases a penicillin lotion or cream may be applied

The condition often resolves rapidly and the paste may then be replaced by a simple dusting powder, of which the following is an example

Talc	2
Boric acid powder	20
Zinc oxide	40
Light kaolin, to	100

[illegible] be avoided

The time-honoured zinc and castor oil ointment forms a relatively impervious film between the infant's skin and its irritating urine, it is less messy than soft paraffin Water-miscible agents must be avoided

PATCHY DISCOID ECZEMATOUS DERMATITIS

AETIOLOGY

A clinical entity of uncertain aetiology, in which discs of papulo-vesicular erythema develop symmetrically with preference for the extensor surfaces of the forearms and legs, this condition is probably endogenous in origin

TREATMENT

A favourable response is often obtained by injections of the patient's own whole blood, starting with 2 millilitres and increasing by 2 millilitres at each weekly injection, until the fifth week when an injection of 10 millilitres is reached The blood

[illegible]

A bland application, such as zinc cream or calamine liniment should be applied, and phenobarbitone, 1 or 1½ grains, should be administered in the evening to discourage scratching during the night

Occupational irritants, rough clothing, and soap must be avoided until the condition subsides *and an attempt should be made to reveal and, if possible, relieve* any state of emotional tension or anxiety

SEBORRHOEIC DERMATITIS

Classification

This form of dermatitis is associated with greasy, yellow scaling and arises in [illegible] Three grades of the seborrhoeic [illegible]

and between the scapulae, thirdly overt seborrhoeic dermatitis involving, in addition to these areas of skin, the flexures and occasionally the trunk and limbs in patchy fashion

Prevention

[illegible]

protein and excessive carbohydrate or alcohol, or from gastro-intestinal disorders, insufficient exercise particularly in association with an excessive carbohydrate intake, focal sepsis, outward irritants (occupational, cosmetic, or therapeutic), certain drugs, including gold and arsenic, undue emotional stresses, heat, and particularly humidity

Treatment

General treatment of the seborrhoeic state

All the aggravating factors mentioned above must be avoided, also spiced foods, chocolate excessive or very hot tea, coffee, or cocoa Extra proteins should be provided if there is reason to believe that a deficiency exists Under present rationing conditions, this can be done by giving proteolysed liver orally Vitamin B complex supplements should also be prescribed If there is evidence of androgen–oestrogen imbalance, stilboestrol may be prescribed

Local treatment of the seborrhoeic state

For pityriasis simplex, the following lotion is useful rubbed in through partings nightly, or on alternate nights, depending on the severity of the condition

Mercuric chloride	½ gr	30 mg
Salicylic acid	*10* gr	600 mg
Oil of rosemary	20 min	1 2 ml
Castor oil	60 min	4 ml
Industrial methylated spirit, to	1 fl oz	30 ml

The amount of castor oil may be increased or diminished as required Resorcin (5 grains) may be added to the above lotion if desired In cases with the greasy scaling of pityriasis steatoides, a lotion such as one of the following may be found more beneficial

(1) Salicylic acid	10 gr.	600	mg
Precipitated sulphur	20 gr.	1 2	g
Glycerin	20 min	1·2	ml
Solution of calcium hydroxide, to	1 fl oz	30	ml.
(2) Salicylic acid	10 gr	600	mg
Precipitated sulphur	10 gr.	600	mg
Emulgent base, to	1 oz	30	g

In cases in which discrete, follicular, scabbed *papules are found, alibour water* (Lotio Cupro-Zincica (*N F*)) is often helpful

Sometimes a secondary infection of impetiginous type arises and is best dealt *with by penicillin cream for a few days before using one or other of the above* preparations

For the mild seborrhoeic state on the trunk, a calamine lotion with 2 per cent of *sulphur is usually effective, or the following may be preferred*

Precipitated sulphur	15 gr	1 g
Salicylic acid	10 gr	600 mg
Compound Paste of Zinc Oxide (*B P*) to	1 oz.	30 g

General treatment of seborrhoeic dermatitis

In all cases of seborrhoeic dermatitis, consideration must be given to the possibility of precipitation of the condition by one or more of the factors mentioned under the heading Prevention (page 1159) Careful questioning may reveal the contact with outward irritants from occupation, hobbies, cosmetics, previous [illegible] and friction [illegible] disorders If there is any reason to believe that [illegible]

Many cases of seborrhoeic dermatitis are precipitated by emotional [illegible] particularly those having a detrimental effect on the patient's self-esteem, with [illegible] attempt must be [illegible] as lies within the [illegible] be helpful in the treatment of many patients of this type, in the worst cases a psychiatrist s help may be *desirable*

Local treatment of seborrhoeic dermatitis

The lesions of seborrhoeic dermatitis are so polymorphic that treatment can only be suggested on general lines

When treating the scalp the hair should be cut short An emulsion containing 2 per cent of sulphur and 2 per cent salicylic acid may be prescribed in states of less acute inflammation or Pragmatar ointment may be used but for more severe cases a lotion such as the following may be prescribed

Solution of coal tar	10 min	0 6 ml
Glycerin	60 min	4 ml
Dilute solution of lead subacetate	120 min	8 ml
Distilled water to	1 fl oz.	30 ml

A suitable cleansing agent must be prescribed to remove greasy scales and debris A spirit shampoo may not be tolerated in the acute phase when an aqueous solution of Cetavlon 1 per cent is a very satisfactory substitute On the beard area a 3 per cent Vioform cream is often both effective and well tolerated

may be prescribed

Glycerin	60 min	4 ml
Dilute solution of lead subacetate	60 min	4 ml
Industrial methylated spirit	*60 min*	*4 ml*
Distilled water to	1 fl oz	30 ml

An alternative is sulphur or ichthammol (1 per cent) incorporated in calamine lotion

For smaller patches on the trunk and limbs ichthammol 2 per cent with solution of coal tar 2 per cent may be incorporated in a zinc cream These substances may

(Castellani s paint)

Silver nitrate	10 gr	600 mg
Spirit of nitrous ether to	1 fl oz.	30 ml

If this preparation stings unbearably a solution of silver nitrate 1 per cent may be employed

After the acute or exuding phases have subsided lichenification often develops In this phase stronger tar preparations may be employed such as 6 per cent or even 12 per cent solution of coal tar in zinc paste These thickened lesions may also respond favourably to the following

Ammoniated mercury	10 gr	600 mg
Solution of coal tar	60 min	4 ml
Ointment of wool alcohols to	1 oz.	30 g

The affected areas should always be cleansed only with bland vegetable oils or with liquid paraffin

It is at this stage of lichenification that x rays are often very helpful or thorium X 1,500 electrostatic units per millilitre in spirit may be applied with a camel s hair brush to the affected area at fortnightly intervals on not more than six occasions

SENSITIZATION DERMATITIS (ECZEMA)

Sensitization dermatitis or eczema is a form of dermatitis in which constitutional susceptibility is predominant and outward causes are less obvious Very careful and repeated questioning is necessary to exclude possible irritant contacts—physical chemical and infectious (due to cocci or fungi) Patch testing should be carried out with suspected agents when possible

Two main forms are recognized (a) localized and (b) widespread and generalized tending to be symmetrical in distribution and arising from sensitization to local contacts, bacteria and fungi or breakdown products of the skin or from other unknown causes This widespread type is specially likely to arise from the use of irritant chemicals on moist areas of skin particularly if the application is prolonged concentrated or widespread The more common causes to-day are sulphonamides flavine mercurials other antiseptic and anaesthetic agents rubber adhesive strapping and penicillin cream Internal causes (infections focal and open and

avoid an error in diagnosis

Prevention

Prevention depends on the avoidance of all known irritants and of undue fatigue worry or excitement particularly by those who are emotionally labile Individuals with a tendency to eczema should be discouraged from carrying out self treatment

Local Treatment

The local treatment of both forms depends upon the stage of the eruption In the acute vesicular exudative phase lotions are best four suitable prescriptions are *given below*

(1)	Glycerin	60 min	4 ml
	Dilute solution of lead subacetate	60 min	4 ml
	Industrial methylated spirit	60 min	4 ml
	Distilled water to	1 fl oz	30 ml
(2)	Calamine	30 gr	2 g
	Zinc oxide	30 gr	2 g
	Glycerin	30 min	2 ml
	Solution of lead subacetate	60 min	4 ml
	Solution of calcium hydroxide to	1 fl oz	30 ml
(3)	Solution of aluminium acetate	120 min	8 ml
	Zinc sulphate	15 gr	1 g
	Zinc oxide	60 gr	4 g
	Talc	60 gr	4 g
	Camphor water to	1 fl oz	30 ml

(4)			
	Calamine	35 gr	2·3 g
	Solution of calcium hydroxide	½ fl oz	15 ml
	Olive oil to	1 fl oz	30 ml

In the subacute crusted stage, creams, such as calamine liniment, Zinc Cream (*B P C*) or hydrous ointment are best In the later crusting and scaly stages, zinc paste is useful and 2 per cent salicylic acid may be added As the condition becomes

be employed

Ammoniated mercury	10 gr.	600 mg
Solution of coal tar	60 min	4 ml
Paraffin Ointment (*B P*) to	1 oz	30 g

If there is evidence of secondary infection, brilliant green, 1 per cent, may be added to the zinc cream or zinc paste

Contact with soap and water must be reduced to a minimum If soap must be used, it should be of the superfatted variety but, as a routine, the skin should be

states is fraught with risk of sensitization and aggravation Hence, these substances should not be employed unless a careful watch on the patient can be maintained.

Chronic patches of eczema

Many chronic thickened patches of eczema respond very well to fractional ex-

Endogenous factors

In all conditions of widespread or generalized sensitization dermatitis, due consideration must be given to endogenous factors, in particular to disturbance of

exciting factors

GENERAL TREATMENT

Sedation is most important and should be of a depth sufficient to prevent the patient from scratching and rubbing the skin from loss of control in a semi drowsy state A daily dosage of phenobarbitone, up to 1 grain three times a day, or Sodium Amytal, 1–3 grains three times a day, may be necessary At night, barbiturates such as Soneryl or Seconal, 1½–3 grains, may be prescribed and, if found to be in adequate, may be given in conjunction with 8 millilitres of paraldehyde It must always be borne in mind that barbiturates may occasionally themselves produce toxic eruptions or aggravate an eczematous state

For children syrup of chloral may be prescribed if the possibilities of toxic eruptions arising from this drug are kept in mind Barbiturates may also be used

For patients who are unable to stop rubbing and scratching, especially the limbs occlusive dressings of zinc paste are often useful, and in the worst cases, particularly in infants, it may be necessary to prevent self-damage to the skin by adequate restrictive bandages and appliances

General measures which may have an influence on widespread sensitization dermatitis include intramuscular injections of the patient's own whole blood, 2 millilitres, raised by 2 millilitres weekly up to 10 millilitres, or of sterilized milk, 5 millilitres intramuscularly, at a similar interval Generalized cases, particularly those arising after contact with sulphonamides and flavine, also respond very favourably to daily injections of crude liver extract, 4 millilitres on each occasion In adults suffering from generalized eczematous states of unknown aetiology, T A B injections, in doses sufficient to raise the temperature to 102°–103° F, are beneficial In an average case, 25,000 000 organisms are given for the first injection, and subsequently 40, 60, 80 and 100 million organisms are required for the following injections It is important, if side effects are to be avoided, that a specially prepared injection of T.A B is used

DERMATITIS FROM SUN, X-RAYS AND RADIUM

Acute Actinic Dermatitis

Incidence

Dermatitis from exposure to sun affects blonds most, the sandy and ginger haired type less, and brunettes least Sunburn may be due to the visible rays, but is usually due to a band in the ultra violet portion of the spectrum

Prevention

The prevention of acute actinic dermatitis depends on protection from undue exposure by every means, including local applications containing physical and chemical "parasols" Physical protection is provided by zinc oxide, bismuth sub [illegible] or brown [illegible]nation [illegible] make valuable emulsifying agents

The highly susceptible person should wear a large hat and even a veil, either black or red

Chemical parasols include 10 per cent tannic acid in 25 per cent spirit or soft [illegible] for [illegible] of [illegible]

para-aminobenzoic acid is most effective Salol, 6 per cent, in equal parts of linseed oil and lime water may also be employed

Treatment

The patient must be kept in cool shaded surroundings and compound calamine lotion or a cold cream, such as hydrous ointment, zinc cream or calamine liniment, may be used

CHRONIC ACTINIC DERMATITIS

mas may follow

Prevention

The measures taken to prevent the occurrence of this condition are the same as for acute actinic dermatitis

Treatment

A bland softening ointment, such as ointment of wool alcohols, is advisable. Keratoses are best destroyed by the firm application of a carbon dioxide snow

radium, the use of which should be reserved for epitheliomas.

ACUTE DERMATITIS FROM X-RAYS AND RADIUM

In the acute form of this dermatitis, burns arise which are comparable to those produced by intense heat or cold, in the chronic form, the condition closely resembles *chronic actinic dermatitis.*

Prevention

lupus erythematosus, in the treatment of ringworm of the scalp and warts, they should only be employed if other methods have failed In functional disorders of the skin, including many cases of pruritus, psychological and other methods should be given a fair trial before recourse is made to x-rays

Treatment

Treatment is the same as that for burns In the first degree burns the application of lead lotion, calamine lotion or zinc cream is usually sufficient.

For second degree lesions, cod-liver oil in equal parts of soft paraffin, liquid paraffin and lanolin, is valuable

Anaesthetizing agents may be employed but the risk of sensitization must always

be borne in mind Phenol, menthol, or benzocaine, 2 per cent, may be used but the first may tend to delay healing Large bullae may be drained three or four days after they develop, by careful puncture at their margin with the unblistered skin surface In deep burns, involving the subcutaneous tissue, it is often necessary to excise the ulcerated area and to carry out a plastic repair *Good results have been reported from cup shaped excision of ulcerations resulting from the treatment of plantar warts, followed by the application of penicillin ointment*

CHRONIC RADIODERMATITIS

T

workers or on treated areas of patients' skin

Prevention

Preventive measures are the same as for acute radiodermatitis

Treatment

The atrophic skin is best treated with a bland ointment such as ointment of wool alcohols or soft paraffin ointment Soap and water should be avoided and the skin cleansed with olive oil, or, when a detergent is necessary, with a 1 per cent aqueous solution of Cetavlon

Keratoses may be destroyed by carbon dioxide snow applied firmly for 30 seconds, or they may be excised with the scalpel, cautery, or diathermy *In some cases, if pain is severe, amputation with removal of the lymph glands may be necessary*

DERMATO-MYCOSES

TINEA BARBAE

Ringworm of the beard is usually acquired from horses and cattle Its prevention depends on the efficient control of these animal infections

TREATMENT

The condition usually responds well to the local application of weak tincture of iodine or Whitfield's paint or ointment, combined with manual or x ray epilation of infected hairs

Castellani's compound carbol fuchsine pigment, phenylmercuric nitrate (*see* Tinea Tonsurans, page 1168) or 1 per cent dithranol may also be employed, but the simpler measures are usually sufficient

TINEA CIRCINATA

Ringworm of the glabrous skin may be due to infection with microspora or trichophyta and may be associated with infection of the scalp

TREATMENT

This type of ringworm infection usually clears without difficulty and the greatest danger is probably from over treatment, *whereby the lesions may seem to spread*

For infection of the feet also, carbol fuchsine paint (Castellani) is an effective application, applied at bedtime, alternatively, *though more warily, the following* may be used

Salicylic acid	15 gr	1 g
Benzoic acid	25 gr	1 6 g
Acetone	120 min	8 ml
Industrial methylated spirit to	1 fl oz	30 ml

In the morning the socks should be dusted with a powder such as that prescribed below

Salicylic acid	2
Boric acid	6
Zinc stearate	3
Exsiccated alum	*1*
Starch	10
Talc	78

Dithranol, up to 2 per cent, in zinc paste may also be used Undecylenates, in the form of a lotion as given above or in creams or powders may give relief and are less likely to sensitize than many other agents, though they are also perhaps a little less effective than some

All peeling skin should be removed with scissors and should be burned Some prefer to use keratolytic agents, to gain access to vesicular lesions on the sole, before [illegible]

[illegible] nent

[illegible] *n the*

hands or of a generalized epidermophytosis, and the latter may result in secondary infection and again in the production of an " ide eruption The secondary infection may lead to a deeper infection of the toe cleft and an abscess in the foot, perhaps

[illegible] or paste and

[illegible] ary infection

should be treated in bed, with potassium permanganate, 1 6 000 soaks twice a day *and the paint which is given below, if necessary systemic penicillin or sulphonamides* given orally may also be administered

Mercuric chloride	½ gr	30 mg
Brilliant green	*5 gr*	*300 mg*
Industrial methylated spirit	360 min	24 ml
Water to	*1 fl oz.*	*30 ml*

The formula for carbol fuchsine paint (Castellani) is not widely known and is as follows

Saturated alcoholic solution of basic fuchsine 10 millilitres, 5 per cent aqueous carbolic acid solution 100 millilitres Filter and add boric acid 1 gramme After two hours add 5 millitres of acetone two hours later add resorcin 10 grammes Dispense in a dark *coloured bottle with a glass stopper*

TINEA TONSURANS

This condition is common in children but is rare in adults, it is due to invasion of the scalp by microspora or trichophyta

Prevention

Treatment

Treatment depends to a certain extent on the nature of the fungus

Microsporon infections

If examination under Wood's light is positive (microsporon infection) favourable response may be attained as follows

Phenyl mercuric nitrate	½
Triethanolamine	1
Lanette Wax, SX	6
Liquid paraffin	6
Soft paraffin to	100

It is usually found that cases due to infection with *Microsporon felineum* respond better to this treatment than do those due to the *M audouini* The treatment has to be maintained for several weeks

later stages only solitary or a small number of positive fluorescing hairs may be detected After treatment lasting for varying periods, often running into three

used, with a varying degree of success, in cases due to *M canis* or to *M felineum* The parents must be warned to expect an inflammatory reaction of the scalp, possibly with some orbital oedema

If the parents are unwilling for these somewhat arduous and prolonged treatments, or if, for any other reason, haste is necessary, or if the treatment fails, x ray epilation should be carried out by the Adamson-Kienböck technique, and the scalp treated with sulphur iodide ointment, Whitefield's ointment, or dilute ammoniated mercury ointment daily at and after the time of epilation Thallium acetate today holds a very small place in the treatment of ringworm of the scalp and this substance should only be used *in hospital under the strictest precautions,*

length of time necessary for x-ray treatment A dose of 200 milligrams should not be exceeded hence, this method is inadvisable in children over 9 years of age

Trichophyton infections

Trichophyton eruptions show no fluorescence under Wood's light and are very variable in their clinical manifestations The *Trichophyton endothrix* produces black

tumours be incised

Infections with *T schönleini* (favus) do not seem to be susceptible to the fungicidal agents at present available and necessitate x-ray epilation of the scalp

TINEA UNGUIUM

Treatment

Ringworm of the nails is the most intractable of all ringworm infections If it must be eliminated, removal of the nails and nail-beds by operation is the only sure method Simple removal of the nails is usually followed by recurrence, no matter

(1) Phenyl mercuric nitrate		½	
Triethanolamine		1	
Emulgent base to		100	
(2) Brilliant green	5 gr	300	mg
Industrial methylated spirit	120 min	8	ml
Distilled water to	1 fl oz.	30	ml

The nails should be filed down so that they are very thin before any of these remedies are used The risk of infection of contacts does not seem to be high

If the finger-nails are affected, inspection must also be made of the toe-nails and of the clefts between the toes, as ringworm of the nails is caused by trichophyta or epidermophyta and the toe nails or the clefts of the toes may be the carrier sites

TINEA VERSICOLOR

A fungus infection of the trunk, tinea versicolor is due to invasion of the skin by *Microsporon furfur*

Prevention

Its prevention depends on the avoidance of sweat retention from impervious clothing and adequate personal hygiene

Treatment

The application of mild peeling agents such as weak tincture of iodine, or of Whitfield's ointment twice a day for four days is usually sufficient A useful lotion is that containing 25 per cent aqueous solution of sodium hyposulphite, or a lotion

of 4 per cent sulphur and 2 per cent resorcin may be used Suberythema exposu to ultra-violet rays twice a week are beneficial

Causes of generalized sweating must be excluded, including phthisis, oth pyrexial states, hyperthyroidism and anxiety states

DERMATOMYOSITIS

CLINICAL FEATURES

This is a rare disease of unknown cause, possibly a form of scleroderma, with ague, Raynaud-like prodromal symptoms followed by erythema with oedema, langiectases and pigmentary changes in the skin, and atrophy and sclerotic changes in the skin and muscles, associated in the acute stage with fever

TREATMENT

Treatment is symptomatic In the more acute stages, rest in bed is essential, with warmth, in the less acute stages, massage, if used at all, must be very gentle, and exercise should be limited Foci of infection must be sought and removed A high calorie and high vitamin diet should be given and small blood transfusions may be of benefit Dried thyroid may help

ERYSIPELAS

DEFINITION

Erysipelas is a streptococcal infection of the skin and subcutaneous tissues

PREVENTION

In the prevention of both acute and recurrent erysipelas, attention must be given to all superficial fissured conditions of the skin which tend to arise particularly around the orifices or secondary to epidermophyton infections of the feet The adequate disinfection and sealing of these fissures by applications such as silver nitrate, 2 per cent in spirit of nitrous ether, is the best way of ensuring permanent immunity from recurrence Apart from this, careful attention must be given to all trivial wounds and abrasions, particularly about the face, and to lesions arising from sunburn Some cases recur for no obvious reason, fissures not being apparent

For the toes, suitable treatment for any fungus infection should be given, and for threatened fissures on the nipples a useful application is friar's balsam, or glycerin and spirit in equal parts

REATMENT

In acute cases, the patient should be isolated in bed Systemic penicillin 250,000 its twice a day for 3–5 days should be employed, alternatively, the patient may eive a full course of sulphadimidine 1 5 grammes, 4-hourly, for 3 days, then ramme 4-hourly for a further 4 days General measures must be employed with diac stimulants for aged and alcoholic patients

ocal treatment is symptomatic and consists of the application of cooling lotions as calamine lotion or liniment

omplaint,
Usually it

ERYSIPELAS PERSTANS FACIEI

This condition is one of lymphatic obstruction and oedema following recurrent attacks of erysipelas

TREATMENT

Most commonly arising round the mouth, this elephantoid condition is very intractable Careful search must be made for fissures and, when these have been obliterated, a few fractional exposures to x rays may help to reduce the swelling These patients must beware of frosts and cold winds Foci of infection in teeth and tonsils must be removed

Sulphonamides and penicillin may be employed but the results are likely to be disappointing, as the condition is a mechanical lymphatic obstruction

ERYSIPELOID OF ROSENBACH

This condition is an acute inflammation of the skin with the organism of swine erysipelas Its prevention depends on protection of all persons employed in the handling of food, particularly fish, meat or poultry, against pricks and abrasions, and on the early and adequate treatment of any such injuries

TREATMENT

The affected arm must be supported in a sling and bland local applications employed The specific treatment is by systemic penicillin, 250 000 units twice a day for 4 days, or procaine penicillin 300,000 units daily for 4 days

ERYTHEMA MULTIFORME

DEFINITION

Erythema multiforme is an acute and often recurrent, sharply marginated erythema, frequently associated with bullae and mucosal lesions

PREVENTION

Some cases of this condition arise from sensitivity to drugs, in particular the

A few cases are precipitated by urticariogenic foods and should be investigated on these lines and the offending agent withheld In many cases, however, the cause

TREATMENT

General Measures

Rest in bed is desirable in all but the more trivial cases Many drugs have been reported to be of benefit but, as the condition is usually self limited in time, it is difficult to assess their value Amongst others, salicylates, quinine, sulphonamides, arsenic and injections of calcium gluconate or of neoarsphenamine have been reported to be of use, but it must be remembered that some of these drugs may

Local Treatment

Local treatment is symptomatic, consisting of the application of ichthammol,

cent tannic acid

For the lesions in the mouth, solutions of hydrogen peroxide, 2½ volumes, or potassium permanganate, 1 6 000, may be used The gargarisma antiseptica of the *Middlesex Hospital Pharmacopoeia*, 1933, is more elegant and soothing It is used undiluted

Boric acid	6 gr	400 mg
Thymol	¼ gr	16 mg
Eucalyptus oil	$\frac{1}{10}$ min	0 006 ml
Oil of peppermint	⅕ min	0 012 ml
Glycerin	24 min	1 5 ml
Fuchsine	as necessary	
Water, to	1 fl oz.	30 ml

ERYTHEMA NODOSUM

DEFINITION

This is a painful nodular condition mainly occurring on the limbs, arising from sensitivity to various organisms

PREVENTION

Prevention of this condition is not possible except by elimination of any foci of infection producing it Some cases, however, seem to be precipitated by the use of sulphonamides particularly sulphathiazole Hence, care in the use of this substance may lessen the incidence of the complaint Other drugs, including bromides, have also been reported to produce this kind of eruption The condition may indicate a recent primary tuberculous infection

TREATMENT

If the erythrocyte sedimentation rate is raised, a period of rest in bed is advisable, and all cases need elevation of the limbs or support by bandaging If streptococci

are thought to be responsible, tonsillectomy and other measures may later be necessary Usually sulphonamides should not be prescribed first because the infection causing the eruption has often subsided by the time the nodules develop

sulphonamides may be curative

In all cases of erythema nodosum, a close search, including x ray examination of the lungs should be made for a tuberculous focus and the patient should be kept under medical observation for two years, in case such a focus should occur In cases of undetermined aetiology, precautionary measures should be taken namely regulation of rest and exercise, a full diet and prescription of cod liver oil emulsion

Various drugs have been recommended but are of doubtful value and are probably best avoided These include arsenical solution and neoarsphenamine Salicylates and aspirin may be given for relief of symptoms or for the rheumatism which may be coincident

As a local application 50 per cent ichthammol in water is useful

FOLLICULITIS BARBAE

This condition is a pustular folliculitis affecting the beard area and sometimes other regions It is generally caused by a staphylococcal infection

PREVENTION

of the seborrhoeic
ndkerchief
ear and

TREATMENT

The use of shaving soap should be abandoned and a dry shaver employed or the beard clipped In milder cases a brushless cream may be an advantage

Local treatment depends on the type of organisms discovered on culture and this procedure is recommended in all but the most trivial and easily alleviated cases because, in addition to those produced by penicillin sensitive staphylococci other cases arise from penicillin resistant staphylococci or from mixed infections

ond well to a lotion
aline solution This is
the latter may cause

maintain its potency up to a fortnight

In more obstinate but responding cases penicillin ointment may be employed but systemic penicillin is not recommended

In cases associated with Gram negative organisms, phenoxetol, 5 per cent, may

In addition to these measures, the patient may carry out manual epilation of discrete pustules, but should be discouraged from carrying out self treatment and experiment Indolent lesions on the neck may be related to ingrowing hairs from a faulty shaving technique

Other agents which have a good reputation in this condition include Quinolor Compound Ointment, an ointment containing hydroxyquinoline sulphate, and benzoyl peroxide A watch must be kept for sensitization Some cases also respond to ointment of ammoniated mercury and zinc oxide ointment in equal parts A useful after shaving lotion is alibour water Sulphathiazole should never be used as a topical remedy

green 1 per cent in Zinc Cream (*B P C*) may help Some chronic cases also respond to ointment of oleated mercury, and a 3 per cent Vioform cream often relieves and is especially useful in resistant seborrhoeic types with eczematous features

In the most resistant and eczematized cases, particularly when irritation is severe and lichenification results, fractional exposures to x rays may be employed

Finally, when treating chronic, crusted, localized patches it may be necessary to carry out epilation by x rays and to prescribe suitable mild antiseptics after the hair has been shed It must be borne in mind that many patients with sensitization dermatitis develop an eruption on the beard area closely simulating sycosis but necessitating the same treatment as eczematized sycosis and likely to be aggravated by antiseptics

FURUNCULOSIS

Furunculosis is a widespread or localized outbreak of boils

PREVENTION

Prevention of these lesions depends on elimination of all diseases and debilitating states which may encourage their development These include diabetes mellitus, chronic nephritis anaemia and nutritional deficiencies all itching dermatoses,

avoided Furunculosis is also more likely to arise in unclean individuals

(1) Tannic acid	25 gr	1 6 g
Ointment of wool alcohols to	1 oz.	30 g
(2) Tannic acid	2	
Salol	2	
Alcohol	96	

For local treatment, a bland application such as calamine lotion should be used or an attempt made to dry the lesions with *surgical spirit or eau-de-Cologne* Powders or zinc paste may also be applied, but it is highly undesirable to use penicillin, sulphonamides or mercurials, as sensitization dermatitis is apt to develop from the treatment of herpes simplex in this way If lesions recur in the mouth (*aphthae*) the application of 5 per cent chromic acid may help to relieve pain

HIRSUTIES

DEFINITION

Hirsuties in women is an excessive development of hair on areas normally bearing coarse hairs in males

PREVENTION

This condition may coincide with hyperidrosis, hence, the relief of this latter condition may tend to check the development of coarse hairs Hirsuties may result from the therapeutic use of androgens

TREATMENT

adiposity
ed investi
ry glands
related to
sturbance
treatment
of choice for younger women or for those who are very sensitive about their condition, particularly for scattered coarse hairs on exposed parts In the hands of the expert, diathermy may also be used This is particularly useful for coarse hairs which have been frequently shaved or plucked

For the diffuse types in which the hair is not coarse, these methods are not
bleaching shaving
gen peroxide 20
ibbed on for 10

employed Unfortunately, treatments of this type carried out by the patient often have a *depressing effect and aggravate feelings of* inferiority induced by the hirsuties On no account should x ray treatment be employed

HYDRADENITIS SUPPURATIVA

PREVENTION

In women this staphylococcal infection of apocrine glands in the axillary or perianal regions may be caused by the macerating effect of rubber dress protectors or irritation by depilatories or deodorants

TREATMENT

All obvious irritants to the axillae or perineum should be avoided and every effort should be made to keep the area dry and the skin surfaces separated As a local application penicillin cream may lead to resolution, or the following paint may be applied with advantage

Mercuric chloride	½ gr	30 mg
Brilliant green	5 gr	300 mg
Industrial methylated spirit	360 min	24 ml
Water to	1 fl oz	30 ml

Incision and drainage is not usually necessary The axillary hair should be shaved or cut short

Metabolic and psychiatric studies should be carried out on the same lines as in cases of widespread furunculosis

Resistant cases often respond favourably to fractional exposures to x rays

HYPERIDROSIS

PREVENTION

In the general form of hyperidrosis (excessive sweating), tuberculosis and other debilitating illnesses, hyperthyroidism, diabetes and states of emotional instability must be excluded

TREATMENT

Treatment essentially consists of elimination of the cause of the excessive sweating If this is not apparent, relief may be obtained by sedation with a bromide mixture containing tincture of belladonna in a dose just below the limit of toleration

In the localized form, which most commonly affects the palms, axillae or feet, emotional factors, particularly fear or guilt (fear of discovery), are also very prominent and permanent relief is most likely to be obtained by treatment on psychological lines Organic nervous disease of the sympathetic nervous system [illegible]

Aluminium phenolsulphonate	100 gr	6 6 g
Perfumed spirit	240 min	16 ml
Distilled water to	1 fl oz.	30 ml

For local treatment of the feet a powder such as that given below is recommended

Salicylic acid	2
Sodium hexametaphosphate	10
Zinc oxide, Talc, Boric acid powder — equal parts to	100

Some favour the use of a formaldehyde preparation but careful watch must be kept for sensitization if it is used

Alum	48 gr	3 2 g
Solution of formaldehyde	24 min	1 5 ml
Lanette Wax SX	33½ gr	2 2 g
Benzoinated lard	42½ gr	2 85 g
Zinc oxide ointment	234 gr	15 5 g

It is essential that socks should be changed daily ill fitting boots and rubber soles should be abandoned Frequent washing is essential and if bromidrosis also is present, the feet may be paddled in sodium bicarbonate 25 per cent and the following preparation applied

Glycerin	50
Dextrose	25
Water	25

X-ray treatment is best avoided as it necessitates sufficient exposure to reduce the activity of the sweat glands, which cannot be carried out without a risk of damage to the overlying skin

ICHTHYOSIS

DEFINITION

Ichthyosis is an inherited abnormality of the skin, characterized by deficiency of the sebaceous glands and faulty keratinization A milder form of the condition, xerodermia, is very common

PREVENTION

Prevention of exacerbations of the condition depends on avoidance of exposure to cold and of all degreasing agents, including soaps, alkalis and hot water When *patients with ichthyosis leave school, it is essential* to find suitable occupations for them and to see that they do not have to handle alkalis, petrol, kerosene, carbon tetrachloride, and other degreasing agents They are best suited for work in warm surroundings

TREATMENT

Thyroid is widely prescribed for this condition and may be of some value from its stimulating effect on metabolism No other *internal treatment is known to* be of avail, but vitamin A has been advocated

In severe cases care must be taken not to take very hot baths Baths should not be more frequent than once a week and only superfatted soap may be used and

this in the minimum quantity Mild cases often enjoy baths and afterwards, when the skin is warm and moist, apply soft paraffin or ointment of wool alcohols, or a simple vegetable oil such as olive oil or arachis oil If the scaling is somewhat excessive, the following is very helpful

Glycerin of starch	1 oz	30 g
Ointment of Salicylic Acid (*B P*)	1 oz	30 g

The exposed parts must be protected from cracking in the winter and every care must be taken to prevent infection of any fissures which may form

IMPETIGO CONTAGIOSA

AETIOLOGY

An inflammatory disease of the epidermis, this condition is said to be caused by staphylococcal or streptococcal infection

PREVENTION

Many cases of impetigo are secondary to coryza, otitis media, paronychial whitlows, or damage to the skin arising from scratching in pediculosis, scabies and other itching dermatoses Friction from rough clothing ("scrum pox") may provide the portal of entry, in many cases, however, no obvious cause is found

TREATMENT

[illegible]

cause, it is important to cut the finger-nails short, both for cleanliness and to prevent damage from scratching as far as possible Mild and localized cases may be relieved by occlusive dressings with Elastoplast In more severe cases, however,

[illegible]

water, calamine lotion, or zinc paste may be very effective To the latter may be added, if necessary, 1 per cent or 2 per cent of ammoniated mercury, or 1 per cent of brilliant green Sulphathiazole cream is effective but its use should be discon-

[illegible]

the condition

Finally, in cases associated with debility or in those not responding to treatment, nutritional supplements and local and general ultra-violet rays may result in more rapid resolution

INSECT BITES AND STINGS

(*See also* Pediculosis and Scabies)

PREVENTION AND TREATMENT

Protection against gnats and other insects that tend to attack the exposed parts is best obtained with the use of a repellant such as dimethylphthalate incorporated in a cream This may also be used on covered parts for protection against fleas and bugs, and—as a long term policy—D D T powder may be dusted under the clothing Harvest-bug bites or flour mite bites can also be prevented in this way, if it is known beforehand that exposure is likely to take place For those who have to visit homes likely to be infested with fleas and bugs, the use of dimethylphthalate and D D T powders is a good precautionary routine

BED BUG

The infestation of a house may result from infestation of adjoining premises or by the introduction into the house of infested bedding or other furniture, luggage, or even firewood

of infected furniture will kill the eggs For major infestations, help should be obtained from the local authority Fumigation by sulphur is only relatively effective the eggs escape metals are tarnished by the fumigant and fabrics damaged Hydrocyanic acid fumigation, though most effective, calls for special precautions including the roping off of the premises and tests of freedom of the house and soft goods, especially bedding from the poison before the premises are certified safe for reoccupation Special fumigating chambers are also used

Treatment of the bites is by the use of calamine lotion, to which may be added 1 per cent of phenol

COPRA MITE

The inflammatory and urticarial papules which may arise in those who handle shipments of coconut or copra may be treated with an ointment containing 4 per cent of betanaphthol

FLEA

legs Before entering suspected premises, D D T , pyrethrum

phenol

FOWL MITE

The itchy papules of urticarial type, mostly on the exposed parts in those handling poultry or other birds, including pigeons and canaries may be relieved by

measures similar to those used for scabies, namely soap and water scrubbing, and the application of sulphur ointment, or benzyl benzoate emulsion.

GRAIN ITCH

mattresses, should be avoided.

HARVEST-BUG

This minute red mite produces urticarial lesions with haemorrhagic puncta,

in calamine lotion will relieve subsequent irritation.

MOSQUITO

who tend to suffer most should avoid being out in the open air just before and at dusk, when the risk is greatest

Treatment consists of the application of calamine lotion with 1 per cent phenol if desired

BEE AND WASP

Prevention depends on care being taken to avoid annoying these insects, but this is usually inadvertent The use of protective clothing by bee-keepers is advisable, since severe reactions may occur even in those who have handled bees for years and have suffered many stings without previous untoward reaction The reason is that the allergic response may be to the sting itself or to pollens contaminating the sting

It is said that a course of injections of a whole bee extract will protect against the stings of wasps, hornets, yellow jackets, and ants in addition, the antigenic substance appearing to be the same

For bee stings ammonia bicarbonate of soda

may be

and not

phenome

given for shock.

For wasp stings, vinegar or lemon juice should be applied

Stings in special areas may call for more active measures and for those in the pharynx or on the back of the tongue a tracheotomy may be necessary, while on the front of the tongue or on the cheeks, cold applications of an appropriate antidote such as bicarbonate of soda or vinegar, should be made.

LICHEN PLANUS

Lichen planus is an itching disease of the skin and mucosae, of unknown cause characterized by flat topped, violaceous papules

PREVENTION

This condition is often precipitated by emotional stresses Hence, these should b avoided as far as possible in those previously subject to this condition Foci of in fection must also be eliminated

TREATMENT

In the more acute cases, rest in bed is essential and is most helpful when combined with relief of any anxieties which can be influenced Owing to the intense itching sedatives are essential in sufficient dosage, such as phenobarbitone, ¼–½ grain tw [illegible]

[illegible]

(1)	Solution of coal tar	30 min	2 ml
	Calamine	*60 gr*	*4 g*
	Glycerin	60 min	4 ml
	Dilute solution of lead subacetate	60 min	4 ml
	Water to	1 fl oz.	30 ml
(2)	Liquor Carbonis Detergens	10 min	0 6 ml
	Calamine lotion to	1 fl oz.	30 ml
(3)	Liquefied phenol	5 min	0 3 ml
	Menthol	10 gr	600 mg
	Hydrous ointment to	*1 oz.*	*30 g*

In more persistent cases, a holiday may be prescribed and treatment given on psychological lines Vitamin B complex is often found helpful and crude liver extract injections may be given The heavy metals have a reputation for relieving persistent lichen planus , a mixture containing 30 minims of mercuric chloride solution may give relief or a course of 6–12 weekly intramuscular injections of bismuth may be effective Alternatively, arsenic may be administered *in the form* [illegible] of 1–3 milli [illegible]

[illegible] 62 per cent procaine B smarsen (bismuth arsphenamine sulphonate) [illegible] is of 0 1 gramme [illegible] of spinal fluid may *relieve the pruritus, deep x ray treatment of the spinal cord has also been credited* with giving relief X rays are however, best restricted to localized hyperkeratotic and verrucose lesions, mainly on the lower limbs, which sometimes persist after *the rest of the eruption has resolved*

It is important to warn the patient that considerable pigmentation is likely to remain after the lichen planus has cleared

Treatment is not necessary for the lesions in the mouth, which are usually symptomless, but lichen planus on the vulva may cause intense itching *necessitating* local measures, with zinc cream or hydrous ointment

LICHENIFICATION

Lichenification (lichen simplex chronicus (Vidal), neurodermatitis) is a circumscribed, dry, erythematous eruption, with accentuation of the normal skin pattern

PREVENTION

Prevention depends on the removal of the necessity for rubbing the skin This is

related to sexual or other frustrations, particularly suppressed aggression

TREATMENT

used on more than six occasions to the same area In certain sites it may be necessary to combine this treatment with occlusive dressings of zinc paste, to prevent relapses from rubbing

LIPS—AFFECTIONS OF

ANGULAR STOMATITIS

This condition is often an intertrigo, produced by an extension of the moist surface from the mucosa to the adjoining skin, from insufficient teeth or the wearing of a denture that does not sufficiently fill out this area of the cheeks, so that a sulcus is formed

Treatment consists of deepening and widening the denture and the application of bland desiccating agents, such as zinc paste If fissures form, these should be treated with silver nitrate, 2 per cent, in water or in spirit of nitrous ether

The condition may also be produced by excessive salivation This is sometimes caused by stimulation from a denture In the presence of any redness of the mucosae, vulcanite or acrylic sensitivity must be suspected and patch tests carried out

nutritional in origin may be found by the presence of atrophic glossitis, koilonychia, or microcytic anaemia Staphylococci and streptococci may be cultured from the

examination performed.

CHEILITIS OF VERMILION AND MOIST SURFACE

Cheilitis exfoliativa (contact cheilitis) sometimes arises from sensitivity to lipstick and this may be confirmed by patch testing Other causes include nail varnish, nicotine, tooth paste, mouthwashes, essential oils, fruit juices, mentholated *cigarettes, and industrial irritants.* Seborrhoeic individuals are prone to cheilitis,

light, smoking, friction), and the application of bland, water-miscible agents *Resistant keratoses in the lower lip may be destroyed by superficial cauterization*

vation *Malignant degeneration of the leucoplakia is not so common here as on the* tongue, but the development of infiltration or ulceration calls for surgical removal

FISSURES OF THE LIP

These may be treated by the application of silver nitrate 2 per cent in spirit of

wool alcohols,

inds It is also

pencil-chewing

FORDYCE CONDITION

The Fordyce condition of lips and buccal mucosa is indicated by yellow or *brownish lesions in the mucosa,* due to the presence of ectopic sebaceous glands It is harmless and calls for no treatment beyond reassurance

RETENTION (*MUCOUS*) CYSTS

For this condition incision, expression of the glairy contents and curettage or *cauterization of the cyst wall is usually sufficient*

LUPUS ERYTHEMATOSUS

The two types of this disease, lupus erythematosus discoides chronicus and lupus erythematosus disseminatus acutus, will be considered separately

LUPUS ERYTHEMATOSUS DISCOIDES CHRONICUS

DEFINITION

This *form* is a chronic, inflammatory condition of exposed parts of the skin, characterized by redness, scaling, follicular plugging, and atrophic scarring

Prevention

There is no certain method of prevention, but spread or aggravation of the lesions is assisted by avoiding exposure to bright sunlight, heat or cold winds

Treatment

A careful search must be made for streptococcal or tuberculous foci of infection If the erythrocyte sedimentation rate is raised the patient should be kept at rest If the condition is suspected to be related to a streptococcal infection sulphonamides may be prescribed but a small initial dose should be given to note the presence or absence of intolerance If there is no untoward reaction, the patient may be given 2 grammes of, for example, sulphadimidine three times a day for three days, and 1 gramme thrice daily for four days Quinine or salicin may be prescribed if there is no reaction to sulphonamides and if the lesion is still resistant, weekly intra muscular injections of bismuth (for example 1 millilitre of Injection of Bismuth, *B P*) for 10–12 weeks may be given with benefit Bismuth is much safer and only

Ultra-violet rays or x rays should on no account be employed

Favourable reports have been forthcoming about the value of oestrogens prescribed for 14 days after each menstrual period

ap

oir

made into a slush with acetone for use over larger patchy areas

LUPUS ERYTHEMATOSUS DISSEMINATUS ACUTUS

Despite treatment few cases survive this severe, febrile illness with widespread areas of erythema and affection of many internal organs

Treatment

The patient should be provided with the best nursing services, blood transfusions are usually indicated, followed by a course of systemic penicillin, 250,000 units twice a day for a week Sulphonamides should be prescribed with extreme caution and foci of infection should not be removed in the acute phase owing to the risk of exacerbation

At a later stage, when the condition becomes less acute, the foci of infection may be slowly eliminated and injections of bismuth employed If gold is used, this should be given in the minimum dose and careful watch must be kept for undesirable effects

LUPUS VULGARIS

PREVENTION

The prevention of this tuberculous nodular affection of the skin depends on sound

lesions, in order to reduce the risk of contamination of the dust of the children's surroundings with tubercle bacilli

TREATMENT

This also depends mainly on a comprehensive, balanced diet, with adequate clean milk. It is important to ensure that the patient takes the prescribed 2 pints of milk a day and continues to do so after the lesions appear to have become dormant The milk supply should be pasteurized, or alternatively boiled, before consumption

Vitamin D_2 (calciferol) provides the best means for resolution of the lesions, but large doses must be given with caution and only with full knowledge of the possible toxic effects of this powerful drug Before prescribing the vitamin, it is wise to x-ray the lungs to exclude active foci of tuberculosis, and to estimate the blood sedimentation rate, because active visceral tuberculosis is an absolute

the treatment should be suspended or uraemia may supervene Dosage should at first be 50,000 international units daily for a week, raised to 150,000 international units daily, after meals, if the patient is found to tolerate it Treatment is continued,

persisting with all other measures to maintain good nutrition

Some favour a more powerful therapy with Sterogyl-15 alcoholic (oral), one ampoule containing 600,000 international units being given on alternate days for

focus in the lungs, by means of *temperature and pulse*

sedimentation rate readings

Lesions resistant to oral calciferol treatment may also be treated by injecting calciferol into them *intradermally in a maximum dosage of 600,000* units at weekly intervals, on about 6 occasions A combination of treatment by calciferol and streptomycin may also prove successful where calciferol alone has failed

With regard to local treatment, nodules proving resistant to the above treatments may be treated with acid nitrate of mercury applied with a pointed match stick—a painful but effective means of eradicating resistant foci. The older treatments by excision, scarification,
Before the introduction
injection into the nodul
treatment also is very painful for the sufferer

Lupus verrucosus usually responds well to calciferol therapy but, if resistant, may be treated with salicylic acid and creosote plasters containing 30 per cent of each, or pyrogallic acid 3–10 per cent in an ointment

MONILIASIS

Moniliasis is an affection of moist contact surfaces of skin with yeast organisms

PREVENTION

TREATMENT

The acute phase responds favourably to 1 per cent brilliant green in zinc paste, or

In the later, resolving phase the liberal application of the following powder may prevent recurrence

Boric acid powder	20
Zinc oxide	40
Talc	40

A low-carbohydrate diet should be prescribed, weight reduction encouraged, and any diabetic state treated

In the form described as erosio interdigitalis blastomycetica, if Castellani's paint does not clear the condition, daily freezing of the affected area with ethyl chloride may give good results

For chronic monilial paronychia of the nail folds, undiluted Neo-Monsol may be

prevented, preferably by not using them or, otherwise, by the use for periods of not more than ten minutes of outsize rubber gloves

When all causes for maintenance of the condition have been removed, treatment by fractional exposures to x rays is justified and may clear the condition

MYCOSIS FUNGOIDES

Mycosis fungoides is a progressive reticular hyperplasia, having exfoliative, infiltrative, tumorous, and ulcerative stages The cause of the condition is unknown.

TREATMENT

This is mainly palliative but makes the patient's life more tolerable Temporary improvement has been reported from intravenous injections of mapharsen, 0 04 gramme weekly Malaria or other fever therapy *may also be employed The best* results, however, are obtained with radiotherapy in fractional exposures, as the tumours are extremely radiosensitive though they tend to become less sensitive on *recurrence and after repeated treatment* Remarkable temporary resolution may

secondary infection following ulceration Greasy preparations may be harmful and the skin should be kept dry, as by the use of a zinc, starch and boric powder

NAIL AFFECTIONS

SIMPLE HYPERTROPHY (ONYCHAUXIS)

This may occur with acromegaly and when the fingers are clubbed from any cause The treatment is of the primary condition

HYPERTROPHY WITH DEFORMITY (ONYCHOGRYPOSIS)

This condition usually develops on the great toes from pressure, injury and neglect Evulsion is followed by recurrence and if the age and general condition of the patient permit, the best treatment *is removal of the nail and excision of the* whole nail-bed This entails careful dissection, particularly at the sides of the proximal end, to prevent the regrowth of annoying nail spurs

INFLAMMATION OF THE NAIL-FOLDS (PARONYCHIA)

ACUTE PARONYCHIA

Acute paronychia caused by pyogenic cocci needs treatment on accepted surgical lines by incision and drainage with removal of the nail plate if necessary Drainage

an attempt to abort early cases

CHRONIC PARONYCHIA

Chronic paronychia is often due to invasion of the nail-fold by *Candida albicans*, but many other fungi and organisms of low grade virulence can cause the malady

Prevention

the course of work
arise *from* the
ay break down

the defensive barrier, leading to chronic paronychia Trauma from manicuring may also have this effect The subsequent access of alkalis and other chemical irritants to the exposed folds produces a paronychial dermatitis

Treatment

Maceration and the use of alkalis must be avoided and the patient should be forbidden to detach the cuticle by mechanical means or to use nail varnish or cuticle remover Liquefied phenol applied underneath the detached fold on cotton wool and left there for a few minutes may result in a chemical inflammatory reaction and reduction in depth of the pocket of inflammation The patient should be warned that the nails are subsequently likely to be deformed A saturated solution of chrysarobin in chloroform has been used with success, or dyes may be employed, such as 2 per cent gentian violet solution, or the following applied on a cherry stick

Mercuric chloride	½ gr	30 mg
Brilliant green	5 gr	300 mg
Industrial methylated spirit	360 min.	24 ml
Distilled water to	1 fl oz.	30 ml

al exposures to x-r The possibility must always be borne in mind that a fissured granulomatous paronychial condition may be a chancre, particularly in dentists, doctors and nurses

INFLAMMATION OF THE NAIL-BED (ONYCHIA)

This condition may result from an acute paronychia, or organisms may gain

bined and the most practical measure

ABSENCE OF THE NAILS (ANONYCHIA)

Absence of the nails is very rare but may occur with severe ichthyosis, epidermolysis bullosa, or other inherited disorders In most cases no treatment is possible

SHEDDING OF THE NAILS (ONYCHOMADESIS)

This condition may occur in exfoliative skin diseases, as, for example, in exfoliative phases of psoriasis or seborrhoeic dermatitis, or after scarlet fever Severe

times familial

BRITTLE NAILS

In states of vitamin D and calcium deficiency, brittle nails may be *associated with lustreless, brittle hair*, and defects of the enamel of the teeth

Treatment, apart from the removal or avoidance of the specific cause *consists of* nutritional measures by the provision of a high-calcium, high vitamin diet

NAIL DYSTROPHY (LEUCONYCHIA)

This clinical term is used for degenerative changes in the colour, texture, and shape of the nails Tinea unguium must be excluded by superficial and deep nail scrapings and by the examination of *nail clippings which have been boiled in potash* Psoriasis must be excluded by examination for " thimble pitting" and for evidence of [illegible]

[illegible] rubra pilaris, alopecia universalis, and in other widespread dermatoses If the cause remains undetermined, systemic conditions, including cervical ribs, syringomyelia, and peripheral nervous disorders, must be excluded *Some cases are congenital* Treatment is that of the primary condition

LOOSENING OF THE NAIL FROM ITS BED (ONYCHOLYSIS)

This condition, starting distally, is often due to the use of strong soaps, alkalis and nail varnish removers It can also arise from subungual corns, fungus infection, psoriasis, eczema or syphilis

Treatment consists in the avoidance of known irritants and the relief of the under *lying cause if it is known*

SPOON SHAPED NAILS (KOILONYCHIA)

One form is familial and unassociated with any ill health The acquired form may arise from outward irritants such as strong soaps and petroleum products and may also be one of the manifestations of the Plummer Vinson syndrome The blood should be examined for evidence of microcytic anaemia

The acquired malnutritional condition responds to treatment with iron and *vitamin B complex*

TRANSVERSE FURROWS (BEAU'S LINES)

These are evidence of recent or present impairment of nail nutrition, either systemic or local and disappear spontaneously as the nail grows

INGROWING TOE-NAILS (UNGUIS INCARNATUS)

Ingrowing toe nails usually arise on the great toes and are due to faulty cutting of the nails so that a sharp point is left at the edge which grows into the flesh and, by acting as a foreign body, stimulates the formation of exuberant granulations

Prevention depends on great care in cutting the nails to avoid leaving this terminal spicule

Early cases may respond to removal of the nail spicule and the application of silver nitrate to the granulations, but if a wedge has been cut by the edge of the nail

[illegible]

shoes or socks.

EXCESSIVE GROWTH OF THE NAIL-FOLD (PTERYGIUM)

Excessive growth of the nail-fold over the nail-plate may be congenital or arise from lack of care of the nails or from past radiotherapy to the nails.

LONGITUDINALLY SPLIT NAILS (ONYCHORRHEXIS)

This condition often arises as a senile atrophic change, but can also result from undue exposure to x-rays.

Treatment is of no avail

TICS INVOLVING THE NAILS

These include nail-biting and nail-fold picking, leading to hangnails The former calls for release of the suppressed aggressional instincts in sport, and the local application of bitter aloes Hangnails may need collodion dressings to assist healing.

PEDICULOSIS

DEFINITION

Pediculosis is infestation with *Pediculus humanus* var. *capitis*, with *P. humanus* var *corporis*, or with *Phthirus pubis*.

PREVENTION

Pediculosis Capitis

[illegible]

become infested Prevention of recurrence depends on concurrent treatment of all members of an affected household The communal use of brushes and combs should be avoided.

Pediculosis Corporis

[illegible]

clothing of those infested, or suspected to be infested, has provided an effective method for destroying the body-louse and preventing its spread.

Phthiriasis Pubis

Prevention of this condition mainly depends on the avoidance of promiscuous coitus, but in some cases the condition is contracted from lavatory seats or bedding

In states of vitamin D and calcium deficiency, brittle nails may be associated with lustreless, brittle hair, and defects of the enamel of the teeth

Treatment, apart from the removal or avoidance of the specific cause, consists of nutritional measures by the provision of a high-calcium, high vitamin diet

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Early cases may respond to removal of the nail spicule and the application of silver nitrate to the granulations, but if a wedge has been cut by the edge of the nail

the condition may not subside by this simple treatment and removal of half the nail followed by a wedge-shaped excision and suture of the flesh at the nail fold will prevent further ingrowing Care must subsequently be taken to avoid tight shoes or socks

EXCESSIVE GROWTH OF THE NAIL-FOLD (PTERYGIUM)

Excessive growth of the nail fold over the nail plate may be congenital or arise from lack of care of the nails or from past radiotherapy to the nails

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This condition often arises as a senile atrophic change but can also result from undue exposure to x rays

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[illegible]

clothing of those infested or suspected to be infested has provided an effective method for destroying the body louse and preventing its spread

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Pediculosis is infestation with *Pediculus humanus* var *capitis*, with *P humanus* var *corporis* or with *Phthirus pubis*

PREVENTION

Pediculosis Capitis

become infested Prevention of recurrence depends on concurrent treatment of all members of an affected household The communal use of brushes and combs should be avoided

Pediculosis Corporis

clothing of those infested, or suspected to be infested, has provided an effective method for destroying the body louse and preventing its spread

Phthiriasis Pubis

Prevention of this condition mainly depends on the avoidance of promiscuous coitus, but in some cases the condition is contracted from lavatory seats or bedding

PERNIOSIS

Perniosis is a group of erythro-cyanotic conditions affecting the extremities, including erythema pernio (chilblains).

PREVENTION

[illegible]

The general health should be maintained and constipation avoided Sedentary work in draughty or imperfectly heated surroundings, particularly on stone floors, is inadvisable for those prone to chilblains

The value of calcium and vitamin D tablets, three before breakfast, as a prophylactic measure, is uncertain, but general exposure to ultra-violet rays may be helpful

TREATMENT

Patients should be instructed to avoid the causal factors mentioned above General attention should be given to maintaining a brisk circulation by suitable employment in active work

[illegible]

should be reserved for the worst and most intractable cases and should only be carried out after an x-ray examination of the lungs and with careful supervision of the patient and a watch for uraemic complications, or other evidences of toxicity

Infra-red irradiation may be most helpful, combined with general ultra-violet irradiation

Apart from this, one of the following local applications may be used

(1) Ichthammol .	50
Water	50
(2) Ichthammol	4
Zinc oxide	8
Soft paraffin . .	. 88

Non-staining iodine ointment may be rubbed into the chilblains, or if they are broken and ulcerated the following may be applied

Ichthammol . .	2
Ammoniated mercury	½
Boric acid .	2
Soft paraffin	95½

Wax baths may be beneficial for chilblains on the fingers and toes

PITYRIASIS ROSEA

Pityriasis rosea is a disease which is usually self limited, without constitutional disturbance and with an eruption of pink, scaly oval patches The cause is unknown

TREATMENT

The patient may be advised of the probable duration of the complaint (about 6–8 weeks) and that isolation is not necessary In a large majority of cases, necessity for treatment, other than symptomatic, does not arise A simple calamine lotion may be applied, or, in the scaly stage the following may be used

Salicylic acid	15 gr	1 g
Hydrous ointment to	1 oz.	30 g

A sub-erythema exposure to ultra violet rays at weekly intervals may shorten the [illegible]

POMPHOLYX (DYSIDROTIC ECZEMA)

DEFINITION

A symmetrical vesicular, often recurrent, eruption of the hands and feet, with or without eczematous dermatitis elsewhere, the condition is best regarded as a form of eczema with special characteristics peculiar to its site in thick skin, containing many sweat glands

PREVENTION

[illegible] ally produced Hot weather may cause pompholyx on the ears and fingers in apparently normal and stable individuals A pompholyx type of dermatitis may be precipitated by contact with industrial and other irritants, including even weak solutions of mercurial salts

TREATMENT

[illegible]

General sedation is necessary and phenobarbitone, ¼–½ grain 3 times a day, may be prescribed In cases in which psychological factors seem predominant, the help of a psychiatrist may be advisable

Locally, the use of bland preparations is best, such as the following, to which solution of coal tar 2 per cent may be added if necessary

Calamine	30 gr	2 g
Zinc oxide	30 gr	2 g.
Solution of lead subacetate	60 min	4 ml
Solution of calcium hydroxide to	1 fl oz.	30 ml

A simple zinc paste may be used as an alternative to the above preparation The vesicles are not opened, as they usually undergo absorption, but large blisters may be incised with aseptic precautions Infected blisters should also be incised and cases with secondary infection are best treated by soaks of potassium permanganate, 1 6,000, or hypertonic saline, followed by the application of brilliant green 1 per cent in zinc cream These infected patients should also be treated with the arm at rest in a sling and if there is lymphangitis or lymphadenitis, they should be confined to bed and sulphadimidine prescribed by mouth for 4 days, or penicillin adminis tered systemically

If a chronic scaly stage follows the subsidence of the vesicles, a few fractional exposures to x-rays at weekly intervals may be of value

PRURITUS

The term pruritus is used for conditions in which itching is the major symptom Physical signs may be absent, slight, or extensive, and may indicate the cause of the pruritus or the results of scratching, rubbing, chemical irritation or secondary infection Pruritus may be generalized, usually in the elderly, or localized, as in ano-genital pruritus, pruritus capitis and other forms

PREVENTION

Pruritus Senilis

The prevention of pruritus senilis depends on avoidance of the cause, when this is known and can be removed

Ano-genital Pruritus

The elucidation of this condition necessitates a thorough history taking and ex amination, its prevention depends on the avoidance of the causes mentioned below

Certain anal, rectal and vaginal conditions must be excluded These include piles, carcinoma of the rectum or colon, threadworm infestation, or trichomonas infection of the vagina Local irritating discharges from the orifices must also be excluded Inquiry must be made into the use of chemicals likely to be irritant, in cluding vaginal douches, contraceptives, and antiseptic or alkaline applications Sweating and lack of cleanliness may be responsible

If the pruritus is of long duration, or is accompanied by signs of inflammation, it is wise to avoid the use of agents likely to produce sensitization, such as benzocaine, menthol or phenol Certain drugs, including phenolphthalein, and liquid paraffin may cause pruritus ani, or the condition may be secondary to a drug eruption involving the vulva, caused by antipyrin, salicylates quinine, bella donna, opiates, sulphonamides, halogens or the barbiturates

Glycosuria must be excluded in all cases, also urinary infections or unduly acid urine A blood count and a fractional test-meal should be performed to exclude

Local skin conditions which may be found include pediculosis, fungus and monilial infections, lichen planus, psoriasis, or seborrhoeic dermatitis, also the rarer lichen sclerosus et atrophicans, senile vaginitis, and kraurosis vulvae

Finally, and particularly when all examinations prove negative, special attention must be given to the emotional state of the patient, as obsessional, tensional types tend to suffer from this complaint Genital pruritus is often a manifestation of heterosexual frustration, the result of a basal emotional conflict Similarly, anal pruritus may be symptomatic of repressed homosexuality. The diagnosis must, of course, only be made on the basis of positive evidence in the history and examination and not merely on the grounds of negative findings of material causes

TREATMENT

Pruritus Senilis

cerebral in origin The patient's mind must be distracted by all possible means and

barbitone, $\frac{1}{2}$–1 grain twice a day, and Soneryl, 3 grains in the evening, is often necessary Androgen therapy has been reported to give relief in men with senile pruritus with atrophic changes in the skin

Ano-genital Pruritus

Treatment depends on the cause or causes, and should include scrupulous cleanliness but with the avoidance of medicated soaps and antiseptics, nutritional measures, removal of local irritants, avoidance of suspect drugs, and the treatment of any discharges or local skin conditions It must be remembered that threadworm infestation may occur in adults

non-sensitizing type, such as calamine lotion or zinc cream incorporating 1 per cent of phenol, 2 per cent of ichthammol, or 2 per cent of solution of coal tar Bran, oatmeal or alkaline baths may be taken If cancerphobia is present, reassurance may be followed by some relief of the pruritus

Treatment by subcutaneous injections of oil containing soluble anaesthetics, undercutting of the perianal skin, or vulvectomy, is irrational and likely to be *followed by a relapse when the patient's distress will be worse than before* Vulvectomy should be limited to precancerous causes of pruritus

Oestrogens, internally or locally, may be used to influence the pH of the vaginal secretion and for cases with atrophic post-menopausal changes of the vagina and *mucosal surfaces of the vulva*

X-ray therapy in weekly fractional exposures should be reserved for cases with lichenification or with scaly, thickened eczematous or psoriasiform changes It is wiser to arrange psychiatric investigation before proceeding to x-rays in all intractable or obscure cases

It should not be used as a routine, "hit-or-miss" therapeutic measure, without

ahead with similar treatment unless full data of the extent and timing of the previous exposures are available and this information suggests that further x-ray treatment is

PSORIASIS

Psoriasis is an eruption, usually chronic or recurrent, consisting of areas of sharply marginated erythema, with silvery scaling

PREVENTION

In the absence of knowledge as to the cause, the prevention of this condition is not possible, but some sufferers from psoriasis find that they can prevent recurrences or render these less severe by general *irradiation with ultra violet rays, twice weekly* Relapses may follow infections, fatigue and emotional strains

TREATMENT

Success depends on the application of general medical principles, with careful consideration of any aetiological factors that may be apparent

Acute Guttate Form

This type most commonly occurring in children, is often noted to follow ton

be prescribed Tonsillectomy may be necessary to prevent recurrences

PSORIASIS VULGARIS—NUMMULAR, DISCOID AND FIGURATE FORMS

In chronic cases of psoriasis, it is necessary to study the patient's general health widely, including the nutritive endocrine and psychological aspects Recurrences often coincide with states of fatigue, anxiety and depression, and it seems that the psoriasis and the mental state are both due to the same cause If psychological factors appear to be prominent, the aid of a psychiatrist is advisable, and for depressed patients amphetamine sulphate 2 5–10 milligrams each morning may be prescribed

If ano genital or widespread pruritus develops in a patient with latent or manifest psoriasis, the scratched areas, particularly the flexures, may develop lesions of psoriasis (Köbner's phenomenon) Hence, in cases of flexural psoriasis, investigation must be carried out as for ano genital pruritus (*see* page 1198)

Some patients are found to respond well to a high dosage with vitamins A, B and D, particularly if they are undernourished and show evidence of avitaminosis Some observers have reported good results from high dosage with vitamin D up to 300 000 units daily but this powerful drug should only be used with full knowledge of its possible toxic effects An x ray examination of the chest, to exclude a latent tuberculous focus, should be carried out before this treatment is begun Alcohol is best avoided

Psoriasis at the time of the menopause more commonly develops in the overweight, hypothyroid type of individual These patients may benefit from dried thyroid 1 grain twice a day

All foci of infection must be eliminated Remission may follow the drainage of an infected sinus or the systemic use of penicillin for an infection

The beneficial effects of resting psoriatic patients in bed, particularly in hospital, are widely recognized and similar response may be obtained in other patients when a holiday is taken

More chronic cases may respond to weekly intramuscular injections of bismuth Some favour Enesol (mercury salicylarsonate) 2 millilitres containing 0 06 gramme intramuscularly weekly The injections are painful and best combined with 2 millilitres of 2 per cent Novocain Some patients respond to T A B therapy, [illegible]

Arsenical solution may be prescribed for patients in whom the condition is resistant, but this should be deferred until other methods have been tried and should only be prescribed for short periods, owing to the risk of development, perhaps years later, of keratoses and carcinomas in the skin

The following (1) makes a useful local application for the scalp, but some cases respond better to oil of cade, and a suitable preparation (2) is also given below

(1)	Salicylic acid	10 gr	600 mg
	Ammoniated mercury	10 gr	600 mg
	Solution of coal tar	60 min	4 ml
	Ointment of wool alcohols to	1 fl oz.	30 ml
(2)	Oil of cade	60 min	4 ml.
	Salicylic acid ointment to	1 oz.	30 g

For the body, the best treatment consists of an application containing tar, combined with local and general ultra-violet irradiation The scales should *first* be removed by scrubbing with a nail brush and the following paste then applied at night

Solution of coal tar	20 gr	1 2 g
Zinc oxide	120 gr	8 g
Soft paraffin to	1 oz	30 g

This paste should be cleaned off with liquid paraffin in the morning and be followed by a sub-erythema exposure to ultra-violet rays Care must be taken not to produce a moderate or strong erythema or exacerbation may result, with dissemination or even an exfoliative dermatitis (this reaction may result also from over vigorous local treatments with mercury, chrysarobin, or dithranol) After the light treatment a soap and water bath or an oatmeal and soda bath is taken loose scales are rubbed off, the skin is dried and the tar [illegible]
daily for 2–4 weeks Autohaemothera [illegible]
Many patients appreciate that their [illegible]
sunlight but exposure to heat, *particularly humid heat, may be harmful Further,* sunburn should be avoided and some patients with psoriasis even find that the sun is harmful to their condition

A useful alternative application is R W MacKenna's ointment consisting of equal parts of salicylic acid ointment, tar ointment, dilute ointment of mercuric nitrate, and glycerin of lead subacetate ointment

Chrysarobin and its synthetic substitute, dithranol, must always be used with caution and are best reserved for patients under medical observation Chrysarobin should not be used on large areas of skin or near the eyes The patient should be warned that the clothing and hair will be stained by it Over use may lead to exfoliative dermatitis When this substance is employed, the surrounding healthy skin should be protected with soft paraffin ointment and a 5 per cent chrysarobin ointment applied daily to the lesions until they become red and inflamed after which the areas should be dressed with zinc cream Care must also be taken with the use of dithranol The official preparation, containing 0 1 per cent is of little use The patient should be treated in hospital, starting with 0 5 per cent applied to small areas, to note the tolerance If necessary, the strength may be raised gradually to 2 per cent or even 3 per cent Dithranol also stains clothing After the course of treatment, zinc cream should be applied, if necessary combined with 2 per cent salicylic acid, or equal parts of glycerin of starch and salicylic acid ointment may be used for scaly remnants

X-rays may be employed for large or chronic patches of psoriasis but are best reserved for emergency purposes when it is necessary to clear certain areas of skin, as their effects are only temporary and x ray dermatitis may result from their repeated use A more useful application, particularly for solitary or a few resistant patches, especially on the pubis or in the flexures, is thorium X, 1,500 electrostatic units in 1 millilitre of spirit, applied at fortnightly intervals

Regarding all measures for psoriasis, it may be said that a treatment which seems to help one patient may not benefit another and may not even benefit the same patient in the next recurrence, and as psoriasis is a disease with characteristic remissions, improvement may be independent of the treatment being used Enthus

iasm over results of treatment must therefore be moderated, unless these results can be produced repeatedly in the same and other patients

PSORIASIS OF THE NAILS

This condition is often not amenable to treatment but a course of arsenical solution may be followed by improvement

PSORIASIS WITH ARTHROPATHY

These patients usually have a widespread and severe form of psoriasis, often including involvement of the face The treatment, so far as the joints are concerned, should be on the general lines advised for the treatment of rheumatoid arthritis [illegible]

In some cases good results have been obtained by the administration of arsenic by mouth The psoriasis may be treated with mercury and tar ointment, but if it is very extensive the risk of producing an exfoliative dermatitis must be borne in mind and a bland application, such as soft paraffin ointment, is to be preferred

PSORIASIS UNIVERSALIS

In this rare and extremely widespread form, it is advisable to apply only soft paraffin ointment to the skin, owing to the risks of intoxication and exfoliative dermatitis from stronger applications

PARAPSORIASIS

This rare condition is more resistant to treatment than psoriasis and best results are obtained by the use of general ultra violet light irradiation There have been reports of considerable improvement from the administration of vitamin D_2 Daily doses of some 150 000 units are required, given with the usual precautionary measures as recommended under section on lupus vulgaris (*see* page 1188)

PUSTULAR PSORIASIS OF THE EXTREMITIES

This condition, the relationship of which to psoriasis is in dispute, is most intractable Foci of infection, particularly in the tonsils, should be eliminated [illegible]

ROSACEA

This condition is a pathological flushing of the face with enlargement and inflammation of the pilo-sebaceous follicles

PREVENTION

Prevention depends in part on personality adjustment, as rosacea is specially liable to develop in women of a highly conscientious type, leading overactive lives

nd often with a very high level of personal self esteem which is constantly threat ned by trivial occurrences, resulting in feelings of guilt and shame The personality ype is very similar to the seborrhoeic type, and rosacea is often found to coincide ith the seborrhoeic state Social and sexual difficulties are often apparent and tea rinking is usually excessive Dyspepsia may or may not be present but even in its bsence the condition must be regarded as being gastro intestinal in origin

REATMENT

The confidence of the patient must be obtained, the pathogenesis of the condition xplained in simple terms, and the sufferer advised to avoid excessive hurry, xcitement, and too many activities This can often be done by advising a slight elaxation from the excessively high standards, for example in relation to house ride, excessive committee work and other additional activities that may have been aken on unnecessarily By psychological means feelings of anxiety and guilt may be elieved and every attempt must be made to help the patient through times of motional stress as easily as possible

Sudden changes of temperature and exposure to heat must be avoided and meals

vith reduction of carbohydrates and a sufficient protein content Foods to be voided include tea, coffee, alcohol, and all very hot drinks, also spiced foods,

njection, 10 milligrams twice a week, alternatively, a crude liver extract may be sed in a dose of 4 millilitres twice a week Administration of vitamin C may also elp With meals, the patient may take the following mixture, half an ounce in alf a glass of water

Dilute hydrochloric acid	30 min	2 ml
Glycerin of pepsin	30 min	2 ml
Syrup of lemon	as necessary	
Water to	½ fl oz	15 ml

A few patients who are not improved, or who may even be upset by this mixture, nay substitute an alkaline mixture, for example, Mistura Rhei Ammoniata cum oda (*N F*) or Mistura Magnesii Carbonatis Aromatica (*N F*) If bromides are rescribed, a careful watch must be kept for signs of intolerance Phenobarbitone,

resent, and foci of infection must be eliminated, particularly in the teeth and tonsils

Rosaceous individuals, like all seborrhoeic patients, are susceptible to outward ritants Hence, bland applications only should be employed Calamine lotion with e addition of precipitated sulphur 2 per cent or ichthammol 2 per cent, is most seful Lead should not be combined with sulphur as the lead sulphide which is ormed in the follicles is very disfiguring Alternative remedies include lotion of ulphurated potash

(a) Potassium sulphate	120 gr	8 g
Water to	1 fl oz.	30 ml
(b) Zinc sulphate	120 gr	8 g
Water to	1 fl oz.	30 ml

The solutions (a) and (b) in the above prescription should be mixed togeth immediately before use Another remedy which may be applied is a lotion contai ing aluminium acetate

Solution of aluminium acetate	120 min	8 ml
Zinc sulphate	15 gr	1 g
Zinc oxide	60 gr	4 g
Talc	60 gr	4 g
Camphor water to	1 fl oz.	30 ml

When there is much scaling, precipitated sulphur, 1 per cent, in zinc cream may be used

Solitary dilated venules may be thrombosed by electrolysis or galvano-cautery Rhinophymatous hyperplasia may be removed surgically with the scalpel or by diathermy, following which x rays may be used to diminish sebaceous activity X-rays may also be used for chronic indurated lesions, but in all cases of this type, and those in which rosacea like lesions affect the lateral parts of the face, histological and other investigations should be carried out to exclude the possibility of the condition being a tuberculide

SARCOIDOSIS

This rare disease is considered by some authorities to be a form of tuberculosis in a highly insensitive and resistant host, presenting as slowly progressing granulations of the skin and subcutaneous tissues lymph glands, lung parenchyma, the bones of hands and feet, and occasionally in other sites, and associated with a negative Mantoux test

PREVENTION

The preventive measures are the same as those for tuberculosis good food, clean ilk, good housing and avoidance of contact with infected persons

REATMENT

The patient should be kept well nourished, with a diet rich in milk and cheese and n a high calorie and vitamin content Rest may have to be enforced but this is not lly necessary The skin lesions may respond to calciferol in high dosage as used upus vulgaris but it is essential to know the condition of the lungs before ng treatment, and the same precautions must be taken as in the treatment of vulgaris (page 1188) hilar and pulmonary lesions do not react favourably to calciferol In the state of our knowledge, it is not clear whether calciferol is advisable in the nt of sarcoidosis with pulmonary involvement

SCABIES

PREVENTION

Prevention of this skin infestation (*Sarcoptes scabiei*) depends on avoidance of over-crowding particularly in bedrooms, and avoidance of sexual promiscuity The condition may sometimes, but more rarely, be spread by hand holding Re infestation is best avoided by concurrent treatment of all members of a household or, if this ideal cannot be attained, of all bedfellows

TREATMENT

Scabies without Secondary Infection

The importance of microscopical confirmation in all but the most obvious cases must be emphasized because, in the absence of this examination, non scabietic, eczematous states may be treated with sarcopticides, with undesirable results The following simple technique is recommended four drops of solution of potash are placed on the centre of a microscope slide, a lancet, of vaccination type, is moist ened in the solution and a number of suspicious lesions between the fingers and on the wrists scraped with it, the resultant scrapings are then placed on the slide in the solution of potash, a cover slip is applied, and examination carried out for acari and ova, with the substage diaphragm adjusted to give maximum contrast between light and shade

[illegible] benzoate 25 per cent em [illegible] (Application [illegible] is a [illegible] be instructed to carry out treatment at home as follows

[illegible] from neck to toes with soap and a rough [illegible] attention to the clefts [illegible] enitalia

(3) Rub yourself all over with the emulsion from neck to toes or apply it with a [illegible] of the skin untreated and giving a

(5) Put on the clothes you were wearing before treatment or, better still carry out the treatment at bedtime and put on your night wear previously worn *Old gloves and socks* [illegible] the hands and feet

Benzyl benzoate	20
Stearic acid	2
Triethanolamine	0 6
Water to	100

If sulphur is used, a similar technique is employed using sulphur ointment 10 per cent, or a mixture of two parts of this with one part of zinc ointment With this treatment it is desirable to have the skin warm Hence, a bath is necessary before [illegible]

obsessional type may otherwise carry on treatment for weeks without end, while the itching now due to a dermatitis medicamentosa, steadily increases

After the full course of treatment, it is advisable to prescribe a calamine lotion and to recommend avoidance of soap and water for a few days, lest eczematization should result

Scabies with Secondary Infection

[illegible]

penicillin cream may be applied to any residual pustular lesions, alternatively, ammoniated mercury, 2 per cent in zinc paste, or brilliant green 1 per cent in zinc paste may be applied

Eczematized Scabies

If eczematization is due to scratching and not to previous treatments, the 25 per cent benzyl benzoate emulsion referred to above may be employed on two occasions at intervals of a week Between these two applications, one of the following mixtures may be used

(1) Solution of coal tar	10 min	0 6 ml
Zinc cream to	1 oz	30 g
(2) *Beta*naphthol	20 gr	1 2 g
Solution of coal tar	10 min	0 6 ml
Zinc cream to	1 oz	30 g

Late Residual Cases

When there is reason to believe that treatment has been incomplete and in cases in which, after careful questioning and examination, doubt still exists as to the diagnosis the following mixture may be employed

*Beta*naphthol	20 gr	1 2 g
Ammoniated mercury	10 gr	600 mg
Solution of coal tar	60 min	4 ml
Ointment of wool alcohols to	1 oz.	30 g

After a week, calamine lotion should be substituted

SCLERODERMIA

DEFINITION

Scleroderma is a chronic skin disorder characterized by hard, smooth, glossy thickening either of the whole surface of the skin or of localized plaques or bands, the cause is unknown

TREATMENT

Spontaneous recovery may occur, especially in children It is well to give the patient a guarded but by no means hopeless prognosis

In the localized form, foci of infection must be eliminated Dried thyroid by mouth may be followed by improvement Apart from this and the routine treatment of any abnormal condition discovered, the local treatment consists of rubbing in a bland ointment such as ointment of wool alcohols

results have been reported from large doses of vitamin D, the blood calcium level being tested periodically Benefit has also been reported from acetylcholine General nutritive measures, massage, warmth and protection should be provided

TONGUE AFFECTIONS

LINGUA GEOGRAPHICA

This condition may cause much mental distress, from the fear that it may be cancerous, and relief of this anxiety is the most important part of treatment It does not respond to treatment, but the use of a harmless mouthwash, such as normal saline solution, may be advisable when anxiety persists in spite of reassurance

LINGUA NIGRA

When there is no hypertrophy of the filiform papillae, this condition may be due to staining from foods and drugs It may also be due on occasion to the abuse of laxatives and to habitual loose stools When hypertrophy of the papillae is present ("black hairy tongue"), moulds tend to grow amongst the detritus between the papillae, and the patient should be encouraged to remove the debris with a tooth brush and to use a hydrogen peroxide or potassium chlorate mouthwash

GLOSSITIS

The Wassermann reaction should be carried out to exclude the smooth atrophy sometimes arising from tertiary syphilis, as well as the cicatricial leucoplakic tongue from this cause A blood examination should also be performed to exclude macrocytic or microcytic anaemia, and examination should be made for other evidences of nutritional deficiencies, particularly of riboflavine and nicotinic acid, diabetes mellitus must also be excluded Glossitis may also be due to ovarian deficiency and in these cases treatment with stilboestrol, 4–6 milligrams weekly, is an effective remedy

I [illegible] be due to [illegible] from the [illegible] com [illegible] ks, the gums may be eroded and tarnished, fillings in teeth may be [illegible] ongue may resemble the geographical tongue, or leucoplakia may be present

LEUCOPLAKIA

In the presence of this condition on the dorsum of the tongue, or just within the angles of the mouth, syphilis is a likely possibility These cases must be closely
of malignant degeneration and active treatment carried out

doormat" type, must be regarded as precancerous and watched accordingly.

GLOSSITIS RHOMBICA MEDIANA

This congenital anomaly is not of serious significance It is usually accidentally discovered by the patient and regarded as cancerous Explanation and reassurance alone are required.

TUBERCULIDES

DEFINITION

Tuberculides are a variety of lesions arising in individuals usually resistant to tuberculosis but sensitized to tuberculin, they include the following types· erythema induratum (Bazin's disease), papulo-necrotic tuberculides, rosaceous *tuberculides, lichen scrofulosorum, and possibly sarcoids and granuloma annulare.*

PREVENTION

This is often not possible Cases have been noted to arise during the treatment of lupus vulgaris with large doses of calciferol For lupus vulgaris calciferol treatment should always be begun in a relatively small dosage (50,000 units daily) and only raised to the full dose in the absence of untoward symptoms The treatment of tuberculides by calciferol is contra-indicated.

TREATMENT

Foci of tuberculous infection must be looked for and, if found, treated, particularly lesions in the lungs, glands and bones. Many patients, however, show no obvious active foci

General treatment is on the same lines as for tuberculosis sound nutrition, clean milk, good housing, fresh air and sunlight. General exposures to the carbon arc lamp twice a week are often very helpful Cod-liver oil may be prescribed As stated above, the use of calciferol is contra-indicated unless there are very strong reasons for believing that the tuberculous focus causing the tuberculide is extra-pulmonary Even then, if it is used, extreme care should be taken in the dose

increased in the absence of exacerbation.

intramuscularly

almost inevitable unless followed by radiotherapy In extensive lesions (as for example, following burns) causing contractures, wide excision and plastic repair may be successful

KERATOSES

These hard, adherent, dark lesions arising on the face and hands mostly in elderly individuals, u[illegible]
bland creams If the [illegible]
is usually followed [illegible]
dioxide snow mixed with a little acetone) may be employed Excision is not usually necessary Radiotherapy may be employed but this is best reserved for cases in which the infiltration, ulceration, or biopsy studies suggest evidence of malignant change

MELANOMA

Any pigmented mole which undergoes changes in colour or size must be regarded as possibly melanomatous, and should be widely excised, both laterally and in depth, great care being taken not to traumatize or press upon the lesion in so doing Bluish black, hairless, nodular lesions, enlarging and tending to bleed easily, are especially suspect It is inadvisable to perform biopsy before excising the lesion In the rare cases of melanotic "whitlows' amputation is necessary

MILIA

These small cystic lesions, often grouped and multiple about the face, are best treated by incision with a cutting needle or fine scalpel, and expression of their sebaceous contents with a comedone expressor If there is a tendency to recurrence, the sac left after operation may be touched with liquefied phenol In many cases treatment is not necessary

MOLES

[illegible] they do
[illegible] t be
[illegible] vith
carbon dioxide snow or fulguration is undesirable and ineffective If the patient desires it, the hairs from a hairy pigmented mole may be removed with safety by electrolysis

MOLLUSCUM CONTAGIOSUM

These multiple, highly contagious, umbilicated lesions are best treated by curettage and cauterization As an alternative, they may be pricked and stirred with a pointed matchstick dipped in liquid phenol or silver nitrate may be applied It is necessary to take measures to prevent spread of the infection and the patient should be re-examined at intervals of one month for further treatment of minute lesions missed on the earlier occasion If the lesions undergo secondary suppurative changes they are best treated by curettage and cauterization of the base

MORPHOEA

use of bland applications such as ointment of wool alcohols is usually sufficient

SEBACEOUS CYSTS

In the absence of secondary inflammatory changes, sebaceous cysts are removable under local anaesthesia, either *in toto* or following evacuation of their contents by pulling out the thick capsule with a pair of artery forceps On the scalp, for example, where the cysts are often multiple, evacuation of the contents before pulling out the capsule enables a much smaller incision to be used If secondary inflammatory changes arise, only incision and drainage can be carried out, with removal of the cyst lining at a later date, if necessary

VITILIGO

The treatment of this condition is most unsatisfactory Its cause is unknown The leucodermic patches may be masked by the use of suitably diluted walnut juice *or permanganate of potash, and special cosmetic preparations such as Covermark*, may also be employed Cases have been reported to improve following the application of 10 per cent bergamot oil in spirit and exposure to sunlight, but if this produces only an inflammatory reaction, without subsequent pigmentation, it must be abandoned Intramuscular injections of gold salts in small dosage have also been reported occasionally to give results

XANTHOMAS

Xanthoma Tuberosum

These lesions arising mainly on the extensor surfaces must be regarded as local manifestations of a general malady The blood cholesterol is usually raised and there may be associated cardiovascular disease involving the valves and coronary arteries A low fat diet may result in some improvement but local treatment is not required

Xanthoma Diabeticorum

This condition tends to occur on the extensor surfaces and is associated with hyperglycaemia and hypercholesterolaemia The condition may respond slowly to the treatment of the associated diabetes

Xanthoma Disseminatum

In this rare form, in which the deposits occur more on flexor surfaces, often with xanthelasma and perhaps mucosal involvement, there is often a coincident diabetes insipidus and disease of the pituitary region, but the blood lipoids are normal

Xanthelasma Palpebrarum

In this condition the fibres of the musculus orbicularis palpebrarum undergo lipoid degeneration If, for cosmetic reasons, the patient desires treatment, the plaques may be excised This entails the removal of the skin as the deposit is embedded therein The excision must be carried out with scissors or with the

galvano-cautery, without subsequent suture, and the resulting scar is usually smooth, pliable, and relatively unnoticeable

ULCERS—HYPOSTATIC

These ulcers arise in the lower third of the legs, and are usually associated with chronic hypostasis

PREVENTION

Prevention of these lesions depends on careful treatment of trivial traumas to the legs, particularly about the ankles. *If an abrasion in this region does not heal*

TREATMENT

If the ulceration is multiple, serpiginous, punched out, and with much infiltration, especially in unusual sites, a Wassermann reaction should be performed to exclude syphilis

The first essential of treatment is support to the ulcerated area and reduction of oedema The best application is an elastic adhesive bandage applied from the toes to the knee, so as to give firm, uniform support A "stirrup of the bandage should

the aid of a sponge rubber pad, cut to fit fairly closely to the ulcerated area Orthopaedic felt (semi-compressed zinc oxide adhesive felt) may also be used Any associated varicose veins should be treated by injection, or ligation with injection

In very few cases are antiseptic measures necessary, but if the ulcer proves intractable it should be swabbed and the pus cultured, followed by the use of such antibiotic or antiseptic agents as may be indicated by the results of the culture In

prevent relapse If
ing a sponge rubber

WARTS

PREVENTION

Prevention of these cutaneous papillomas is difficult, apart from avoidance of contacts, for example, the exclusion of those with plantar warts from swimming-baths and changing rooms

TREATMENT

This is considered under several different headings

Multiple Warts

Owing to the spontaneous resolution noted to occur on occasion, and to the confirmed results of suggestion therapy, it is difficult to assess the value of different treatments When the warts are very numerous, some favour curettage of one or more of the largest, followed by the application of salicylic acid ointment, 25 per cent, to the remainder and this may initiate dissolution Other remedies which may be employed in multiple cases include Epsom salts or lime water by mouth, the latter in a dose of half pint daily for 7 days Arsenical solution may also be prescribed up to 6 minims 3 times a day for 3 weeks Those with a confident manner may get equally good results by "buying' the warts, that is by applying a sixpence to them, or by methods more resembling witchcraft

If multiple warts prove intractable, it may be necessary to anaesthetize the patient and treat the warts with the diathermy, or to curette them out and cauterize their bases In some cases, if the warts are grouped and localized, superficial x ray therapy may be employed

Local keratolytic agents include salicylic acid in ointment (20 per cent) or collodion (12 5 per cent) or as the following paint

Salicylic acid		25
Industrial methylated spirit Ether	equal parts	75

[illegible]

Repeated searing of the superficial portions of subungual warts with the galvanocautery may also give good results, but if this fails it may be necessary to remove a large portion of the nail in order to carry out complete removal by curettage This should be followed by the application of liquefied phenol and cauterization of any bleeding points

Plantar Warts

[illegible]

maceration The skin around the wart is then protected with Vaseline and the foot is soaked in formalin solution, for 10 minutes At intervals, the patient attends for painless removal of the superficial portions of the wart Some prefer to apply the formalin on cotton wool held in forceps, or on a matchstick, and this method may be employed for warts on regions other than the sole Some plantar warts will respond to 25 per cent podophyllin resin applied nightly, provided maceration of the skin is produced by preliminary soaking and enclosure of the dressing with Elastoplast to cause sweat retention

If there is no co-operation, or if these treatments fail, or if a quick result is desired, curettage and electric cauterization is indicated Care must be taken to

remove the "collar" left after curettage and to remove all friable material in the base of the wart and in any burrowing marginal extensions Greater security from recurrences may be obtained from the use of liquefied phenol as a cauterizing agent, followed by electric cauterization of any bleeding points Diathermy is not without the risk of the production of painful scarring, from unintentional "cooking" more deeply than is desired It may be necessary for the patient to rest for two or three days after the operation

If a local anaesthetic is used, it is preferable to give the treatment while the patient is in the prone position, as this not only gives better access and control but also causes relaxation of plantar tissues Furthermore, the patient is not looking at the

lesions, general anaesthesia is necessary.

PENILE, VULVAR AND ANAL WARTS

For warts in moist areas, podophyllin resin is the treatment of choice as follows

Podophyllin resin	25
Liquid paraffin	75

The patient should be instructed to apply this substance at bedtime and to remove it in the morning with liquid paraffin Two, or at most three, treatments should be carried out on consecutive nights, and the patient then attends again for inspection after a week Over-treatment may result in severe balanitis or vulvitis, and a 20 per cent preparation should be used if any secondary inflammation is present Most patients respond to this therapy, repeated if necessary after a week, but those who do not may require destruction of the lesions by electro-cautery or diathermy

SEBORRHOEIC WARTS

These superficial lesions mostly arise on the trunk and face in the elderly; they respond well to the application of salicylic acid ointment, curettage and electric cauterization or freezing for 30 seconds with carbon dioxide snow

WARTS OF THE BEARD AREA

These warts are best treated by cautery destruction under local anaesthesia The patient usually has to attend again in a month or two for destruction of lesions missed on the first occasion, because they were too small

R. M B MACKENNA
BRIAN RUSSELL

THE SELECTION OF VEHICLES FOR LOCAL APPLICATIONS IN DERMATOLOGY

When deciding on the best choice of a local remedy for any dermatosis, it is ... of the vehicle ... ntained

... must be given to the type of skin, greasy or dry, light ... to be treated, ... surfaces. ... emedy. Exuding dermatoses need suspensions (shake lotions) or oil-in-water emulsions (oily lotions, liniments and thin creams) For acute erythemas and non-exuding eczematous eruptions, an evaporating astringent lotion may be preferred. Less acute conditions do well with creams or pastes Skin surfaces which are in opposition and macerated respond best to powders with absorptive (starch) and "slip" (talc, zinc stearate) qualities More chronic dermatoses, with scaling and a tendency to fissuring, do well with emollient and water-miscible ointments, and when protection and occlusion are desired, water-immiscible ointments may be used Pastes are intermediate between these last two, as they are protective but not occlusive, allowing some evaporation of moisture from the surface of the skin

The vehicle may or may not affect the drug embodied therein, by solution, chemical change, or combination. Conversely, some drugs may "crack" emulsions into their original separate components

Vehicles have widely differing powers of penetration of the horny layer and follicles, and of absorption A much greater effect will result from the use of a drug in a base that mixes well with skin secretion and exudates, that is capable of penetration and is well absorbed, than from the use of the same concentration of the drug in a base immiscible with water and oil, non-penetrating, and feebly absorbed For this reason, care must be taken to adjust the concentration of any ... of the chosen vehicle, otherwise an ...

... which reduce surface tension (also known as "wetting" or "surface-acting agents") may be added to the prescription

It must be remembered that some vehicles may become altered after application by evaporation or oxidation This applies also to the use of saline lotions which, after evaporation, may leave on the surface a concentration of salt capable of *irritating the skin*

It is well to be conversant with a complete range of tried and trusted local ... in composition, because intoler-...

... various degrees of penetration or absorption, miscibility or immiscibility with water, skin secretions and exudates, removability by water or oil, power of solution ...

TABLE

RANGE OF APPLICATIONS COVERING MOST DERMATOLOGICAL NEEDS

Type (with examples)	Physical properties	Advantages and disadvantages	Indications
Astringent evaporating lotions (Lotio Plumbi et Glycerini, with or without industrial methylated spirit)	Astringent, evaporating, permeable	Minimal absorption; cooling, drying, may be applied frequently by patient, may not be tolerated in eczema, may prove too stinging on exuding areas	Erythemas, subacute vesicular and scaly eczema—dermatitis
Suspension lotions (Lotio Calaminae)	Non-penetrating, evaporating permeable	Cooling; drying, may may prove too drying	Erythemas, exuding dermatoses acne and seborrhoea
Dusting powders (Conspersus Talci Borici)	Absorptive dry lubrication	Cooling, drying, lubricating, may prove too drying	Intertrigo flexural dermatoses, extensive bullous eruptions, mildly exuding dermatoses
Tinctures (Pigmentum Magentae)	(Solution of water-insoluble drugs in alcohol, acetone or ether)	Not messy, easy to apply to circumscribed areas fair penetration, limited use	Fissures, local fungus and bacterial infections
Suspension lotion, made into oil in-water *emulsion* Calamine 35 gr Olive Oil 1 fl oz Lime water, to 1 fl oz	Evaporating, slightly penetrating, relatively *permeable*	Cooling, emollient, protective, not drying *greasy*	Erythemas acute, subacute, and chronic eczema—dermatitis, and other dermatoses
Oil-in-water emulsion ("vanishing cream", Unguentum Emulsificans Aquosum)	Permeable, penetrating, *miscible with* water, secretions, exudates	Cooling, non-greasy, *washable, enhances drug* action, water-soluble antiseptics, *e g* phenol, may be incorporated, may sensitize, incompatible with Cetavlon, and *antiseptic dyes*	Infective and exud*ing* dermatoses, pruritus
Emulsifying ointment (Unguentum Emulsificans)	Miscibl [illegible] (up to [illegible] weight), and e[illegible] meable, good pe[illegible] tration	[illegible] greasy but may unduly degrease the skin unless mixed with wool alcohols	Dermatoses of [illegible] infective

Type (with examples)	Physical properties	Advantages and disadvantages	Indications
Water in-oil emulsion (Unguentum Aquosum)	[illegible]	[illegible] ders.	[illegible] eczema
Emollient Water miscible ointment (Unguentum Alcoholium Lanae)	Penetrating well absorbed promotes water in-oil emulsions with water and skin secretions	Emollient replaces natural fats washable useful for fat soluble medicaments somewhat [illegible] remedies	Degreased dermatoses senile skin xeroderma ichthyosis psoriasis [illegible]
Emollient and protective ointment (Unguentum Simplex)	Relatively impermeable emulsifies slightly slightly penetrating	Slightly emollient protective non washable greasy	Intermediate between Unguentum Alcoholium Lanae and soft paraffin
Protective paste (Pasta Zinci)	Poor penetration [illegible]	Protective [illegible] mitigant for powerful irritants	[illegible] and [illegible]
Protective ointment (soft paraffin)	Inert poor penetration not absorbed [illegible]	Bland emollient not absorbed yellow soft paraffin protects [illegible]	Waterproof protective for burns and [illegible]

Penetrating bases

Lard, benzoated lard arachis oil and wool alcohols are all well absorbed by the skin

The addition of 1 per cent of either triethanolamine or cetyl trimethyl ammonium bromide (Cetavlon) will increase the penetrating powers of bases but they may both *occasionally sensitize the skin*

Sodium lauryl sulphate is used in emulsifying wax for its properties of reducing surface tension

Carbowax 1500 a semi solid wax is soluble in water and dissolves many medicaments and brings them into close contact with the skin It is especially useful on the scalp

Barrier creams

Three kinds of protective creams have to be considered (1) water repellants, (2) oil repellants, and (3) absorption preventers

Water repellants—Refined paraffins protect against water soluble irritants, acids and alkalis For dry operations, the following is useful

Lanette Wax SX	15
Soft paraffin	10
Water	75

The following preparation is recommended for wet operations

Lanette Wax SX	10
Soft paraffin	10
Hydrous wool fat	10
Water	70

These preparations are useless as protection against oils and oil soluble irritants because they may enhance the irritant action of the oil by emulsifying it and so bringing it into closer contact with the skin

Oil repellants—Oil repellant and solvent repellant applications consist of water soluble resins in a vanishing-cream base, the following may be used as a cream

Sodium alginate	5
Tragacanth	5
Stearic acid	20
Sodium carbonate	2
Glycerin	5
Water	63

The following preparation may be used as a dry film

Acacia	10
Borax	2
Water	88

Being miscible with water, these preparations should not be used when handling water soluble irritants

The following is a harmless preparation, useful for preventing undue degreasing of the skin and for hindering the access to the skin surface of both water soluble irritants and irritant greases

Anhydrous lanolin	70
Castor oil	30

Or a simple vanishing cream may be rubbed into the skin before exposure to dirt and oil This preparation is easily removed when washing after work

Stearic acid	20
Sodium carbonate	2
Glycerin	5
Water	73

Absorption preventers—If there is a possible toxic hazard by absorption through the skin, it is wise to avoid the use of lanolin or any of the other substances mentioned above that may be absorbed, because their use may facilitate the absorption of fat soluble toxic substances

Protective creams may also contain non irritating substances intended to detoxify (for example, by neutralization) a known irritant Inert protective powders may be incorporated, if desired, or light screening substances

Vanishing creams

Vanishing creams are used when a cosmetic effect is necessary, as for example, when incorporating light screening agents in a base Pasta Hamamelidis (*B P C*) may be used, or, better, the following

Stearin	25
Glycerin	10
Triethanolamine	1
Theobromate oil	1
Cetyl alcohol	0 5
Distilled water	62 5

The most useful light screening substances for incorporating in the above cream are tannic acid, 5 per cent, or the sodium salt of *para* aminobenzoic acid, 15 per cent

BRIAN RUSSELL

THROMBOSIS IN VEINS

ANTICOAGULANT THERAPY

which is present before the treatment is begun

INDICATIONS AND CONTRA-INDICATIONS

The indications for the use of anticoagulant therapy are thrombophlebitis, which may have been caused by injury or infection, or may follow operation, pulmonary embolism, coronary thrombosis, as prophylactic treatment at the time of operation if there is a past history of thrombosis or embolism, and after operation when there is an added tendency to thrombophlebitis, as in the presence of varicose veins, anaemia and heart disease

Some authorities state that the use of anticoagulant therapy is contra indicated during the first 8 days of the puerperium (a risk of excessive uterine bleeding is present before the uterus is well involuted) but this does not receive agreement from Bauer, in liver disease presenting a low prothrombin estimation, in renal insufficiency, in purpura of any type, in the presence of any lesion (such as a tumour) which has a tendency to bleed, and after operation on the brain or on the spinal cord

PROCESS OF BLOOD COAGULATION

The proper use of anticoagulants is based on a knowledge of the process of blood [illegible]

haemorrhage Thromboplastin acts on prothrombin which is converted into [illegible]

Heparin neutralizes thrombin By its anti thrombin action heparin prevents or *delays the coagulation of blood according to the amount of heparin present* A small quantity of heparin is normally present in circulating blood in order to neutralize small amounts of thrombin which may be present when not wanted Its use in therapeutics is, therefore, rational The effect of heparin is marked within a few minutes of its injection Its action is transient, and the effect of a small dose *passes off in 30–40 minutes*

CONTROL OF HEPARIN THERAPY

The administration of *heparin is controlled, when necessary, by estimating the* coagulation time of the blood, that is to say, the time required, under standard

nditions, for the blood to clot after it has been shed The normal time varies with e method used and it should always be stated The coagulation time is prolonged hen heparin is present in the blood in excess of the normal quantity and it is stimated half an hour after the injection of heparin During treatment with heparin the coagulation time should be maintained at about 15–20 minutes (Lee and White's method) The normal time by this method is 4–7 minutes

The effect of heparin is transient, it is therefore given by intravenous drip, or it is given by intermittent intravenous injection at intervals of 3 or 4 hours Strict control is less necessary than it is in the case of dicoumarol, because untoward haemorrhage is simply dealt with by stopping the administration of heparin

CONTROL OF DICOUMAROL THERAPY

Dicoumarol (dicoumarin) interferes with the production of prothrombin by the liver The amount of prothrombin in the circulating blood is reduced, as a result the time taken by the blood to clot is prolonged and, if excessive doses are given, the blood may fail to clot The effect of dicoumarol is delayed and prolonged The maximum result of a dose is usually produced on the second or third day, and it passes off slowly in 4–14 days

The administration of dicoumarol must always be controlled by repeated estimation of the prothrombin time, because of the time lag that occurs between administration and effect, because of the varying susceptibility of different patients to the drug, because the effect of successive doses may be cumulative, and especially because in the event of excessive dosage there is a danger of severe haemorrhage which may be difficult to control even by vitamin K and blood transfusion

The prothrombin time is the time required for oxalated plasma to clot in the presence of optimal amounts of thromboplastin (rabbit-brain in Quick's method) and calcium When prothrombin is reduced as a result of giving dicoumarol the prothrombin time is prolonged beyond the normal average time of 25 seconds The observed time is related to the amount of prothrombin present in the blood (expressed as a percentage of the normal) by means of a graph or table For example, if 25 seconds is the normal prothrombin time equivalent to 100 per cent prothrombin a time of 60 seconds indicates about 20 per cent prothrombin, a time of 45 seconds indicates 30 per cent of the normal The aim in the administration of dicoumarol is to maintain the blood prothrombin level at about 30 per cent of the normal The coagulation time of the blood is not reduced by dicoumarol unti the prothrombin time becomes dangerously low at a level of about 10 per cer of normal

In 1947 Bauer's extensive research on the use of heparin showed that in cases definite thrombosis frequent pathological tests are not required (Bauer, 1947) strict warning must be given however, about dicoumarol which, owing to its to action requires stringent control by means of daily tests of the prothrombin c tent of the blood In Sweden this drug is prohibited in its use except in hospi where adequate pathological facilities are available

THE DOSAGE OF HEPARIN

The dosage of heparin, as previously stated, should be adjusted so that the b clotting time is kept in the neighbourhood of 20 minutes The dosage according to the urgency and severity of the condition under treatment B

routine for all cases of deep vein thrombophlebitis or embolism (or both) is described by him as follows (Bauer, 1946).

As soon as thrombosis (or pulmonary embolism) is diagnosed 150 mg of heparin is

hospital two or three days after getting up. . . .

It is of the utmost importance that the patients should get up when, or even before, the heparinisation is terminated. Most of the failures with heparin treatment are due to this rule not being observed Because of old prejudices, doubt may be felt about . . . allow-

be up and about

Having regard to the number of cases Bauer has treated and to the remarkable results, it is recommended that this technique should be followed until such time as an improved routine may be described.

Heparin is dispensed in ampoules of strengths of 1,000 or 5,000 units to the millilitre It should be remembered that roughly 100 units are equivalent to 1 milligram of heparin. Fortunately, heparin is becoming cheaper, but in many cases, owing to the expense, the combined method of giving both heparin and dicoumarol is necessary

The continuous-drip method of giving heparin entails the use of an ordinary blood transfusion apparatus In practice, however, good results are obtained by

practicable

ous in-

mixture

Its use

THE DOSAGE OF DICOUMAROL

The dosage of dicoumarol should be so adjusted that the prothrombin content of the blood is reduced to 30 per cent of normal As previously mentioned, dicoumarol *does not usually reach a maximum effect for 24–48 hours.* It must never be used

of normal may be produced rapidly This group needs special care if serious haemorrhage is to be avoided As a guide to dosage the following plan should be

below this level calls for the omission of the dose on that particular day. Pro-

4-hourly under certain circumstances is difficult, that dicoumarol is sometimes preferred to heparin

HEPARIN AND DICOUMAROL COMBINED

is appreciated that this blood change has been occasioned by the dicoumarol which has "cut in," since heparin has but little effect on the prothrombin time

CONTROL OF HAEMORRHAGE

The control of haemorrhage due to an excessive dose of either or both of the anticoagulant drugs under discussion is as follows.

When haemorrhage occurs due to heparin, the drug should be immediately withdrawn and a transfusion of fresh blood should be given It is essential that stored blood should not be used For an immediate counteraction of the effects of heparin, 5–10 millilitres of a sterile 1 per cent solution of protamine sulphate

reaction to treatment by means of a blood transfusion is frequently dramatic and *no case may be considered to be hopeless*

Bauer, G (1946) *Lancet*, 1, 447.
— (1947) *Lyon chir*, 42.
Loewe, L., and Rosenblatt, P (1944) *Amer J med Sci*, 208, 54

Thromboplastin is usually unstable and the prothrombin time, as measured with the usual technique, varies grossly according to the sample of thromboplastin used. For this reason the

prothrombin time of a normal control should be estimated at the same time The prothrombin index is $\frac{\text{the time in the control}}{}$ × 100

20-25 seconds

PAUL WOOD

THROMBOPHLEBITIS

DEFINITIONS

Thrombophlebitis signifies inflammation of a vein accompanied by thrombosis, as a result of which the lumen of the vein is either partially or completely blocked by

inflammatory reaction, being in contradiction to the term *thrombophlebitis*, which implies the presence of a firmly attached clot associated with inflammation Phlebothrombosis, however, becomes a thrombophlebitis in the course of time owing to the development of an inflammatory reaction

Phlebitis without clot formation may occur from local injury or from inflammation spread from the surrounding tissues If clotting occurs the term thrombo phlebitis should be used to describe this condition

CHEMICAL THROMBOPHLEBITIS

A severe reaction from the injection of a sclerosant is not uncommon This is not serious, since the inflammation is produced by sterile chemicals This type of chemical thrombophlebitis may be avoided by giving a small test dose to a new patient, since some react far more actively than do others

TREATMENT

Reassurance, cold compresses, sedatives and restricted activity are sufficient treatment, because the thrombophlebitis soon subsides

THROMBOPHLEBITIS ASSOCIATED WITH VARICOSE DISEASE OF THE SUPERFICIAL VEINS

TREATMENT

Once the condition has developed many patients have, in the past, suffered long periods of inactivity in bed This is unnecessary and, in fact, often harmful, since

enforced rest may promote a further extension of the clotting process Small patches of phlebitis occurring in tributaries of the saphenous veins are best treated by firm strapping, either with Elastoplast or by means of a two-way-stretch bandage The patient is then told to adopt an ordinary quiet mode of life If the main veins are involved, treatment consists in keeping the patient ambulatory after

placed over the saphenous opening and the patient should be allowed moderate activity Surgery, in the form of a high resection of the internal saphenous vein, is more satisfactory, since most cases settle down within 2 days of this treatment. It is only possible to resect the vein if the terminal few inches are still unclotted, for

ment beyond strapping is not called for, but attention to the general health and the administration of sedatives are required Embolism is not very common in this type of thrombophlebitis and the anticoagulant drugs (dicoumarol and heparin) are seldom required

SUPPURATIVE THROMBOPHLEBITIS

Treatment is essentially surgical in this condition, which calls for a proximal ligation of the affected vein

The sulphonamide series of drugs and penicillin will be required on general principles and thrombus formation may be controlled by the use of dicoumarol and heparin, or one of these (*see* Anticoagulant Therapy, page 1222)

THROMBOPHLEBITIS INVOLVING THE DEEP VEINS OF THE LOWER EXTREMITY

This type of thrombophlebitis is usually secondary to childbirth or to an operation, especially to pelvic operations

Prophylaxis

The prophylaxis of the condition is of the utmost importance and the measures taken to prevent this involvement of the deep veins are the same as those taken for the prevention of pulmonary embolism They are as follows

A comfortable position on the operating table is essential Pressure on the calves should be avoided by putting a soft pillow under the calf of each leg

Leg exercises should be carried out every few hours as soon after the operation as possible. Immediately after the operation, deep breathing exercises and acts of coughing should be performed

A correct posture in bed is necessary after the operation There must be no pressure on the legs and the Fowler position with a ' donkey" beneath the knees may be used only with discretion and subject to movement of the limbs as previously described

The surgical technique at the time of the operation should be gentle with the avoidance of rough handling of the tissues and the blood vessels

The patient should get up from bed as soon as possible after operation or child birth

The fluid intake should be adequate

Sources of focal sepsis should be dealt with, whenever possible, before an opera tion Blood dyscrasias and anaemias should receive attention if present

Dicoumarol or heparin (*see* Anticoagulant Therapy, page 1222) may be used as a prophylactic in patients who run an increased risk of venous thrombosis, as for instance senile subjects, and those suffering from heart disease, severe anaemia or from other blood disorders

Varicose veins, if present, should be treated *pre operatively* *Many surgeons* recommend the ligation of the veins prior to abdominal or pelvic operations

TREATMENT

An early diagnosis of venous thrombosis is essential to successful treatment and to prevent the serious complication of pulmonary embolism Treatment should be instituted immediately a diagnosis has been made of thrombosis of either the ilio-femoral, femoral, popliteal or calf veins A routine has been instituted after the treatment of several thousands of cases at the Mariestad Hospital in Sweden The results published have been highly satisfactory Bauer (1946) of this hospital claims that, in a well-established case of thrombosis, heparin may be given in large doses with little fear of causing a haemorrhage When heparin is used prophylactically, however, every precaution must be taken and the coagulation time of the blood before injection must be determined

[illegible]

Usually on the fourth or fifth day, when the heparin dosage is diminished, the patient is either free or almost free from fever It is at this stage that he may be encouraged to leave his bed Opiates for pain may be required

Heparin, 150 milligrams, is injected intravenously as soon as the diagnosis of thrombosis is made This dose of heparin is repeated at 4-hourly intervals Four injections in all are given on the first day

Heparin, 100 milligrams, is given 3 times on each of the following 2 days

As previously mentioned, as the temperature settles the patient is allowed out of bed with the leg supported by an elastic bandage The dose of heparin is usually reduced to 100 milligrams twice a day, according to the estimation of the blood clotting time

The course of heparin usually lasts for 6 days but it is recommended that an evening dose of 100 milligrams be continued for one week after the patient has become ambulatory

Thrombus formation cannot be controlled by local treatment, but a kaolin poultice will often relieve pain

Bauer (1946) states that there are hardly any contra indications to this plan of treatment An excessive dose of heparin may be controlled by the administration of

5-10 millilitres of a 1 per cent protamine sulphate solution Alternatively, a blood transfusion or 40 milligrams of synthetic vitamin K is given

This heparinization treatment is ideal The patient spends only a short time in bed and the more heroic and less satisfactory measures such as ligation of the iliac or femoral veins are avoided If heparin is not available, dicoumarol may be used orally as a substitute, remembering that it is less satisfactory and that the effect has a 36-hour delay Details of this treatment are given under Anticoagulant Therapy (page 1224) Patients who have not had intensive anticoagulant therapy may be left with swollen oedematous limbs resulting from the blockage of the vein These patients must receive support from an elastic bandage of the two-way-stretch type Failure to provide this support may lead to ulceration The elastic *bandage also has a therapeutic effect in causing a recanalization of the thrombosed vein*

Bauer, G (1946) Lancet 1, 447
Ochsner, A, and de Bakey, M (1939) *Sth Surg*, 8, 269

THROMBOPHLEBITIS MIGRANS

INTRODUCTION

Thrombophlebitis migrans, which is also known as recurrent idiopathic thrombophlebitis, was first described by Jadioux in 1845 It falls essentially into the cate- [illegible] be associated with trauma, [illegible] gout to be a predisposing [illegible] both legs and seemed to migrate from one leg to the other The disease, however, sometimes involves the superficial veins of the upper extremities A segmental distribution is present with healthy vein intervening Fusiform swellings, tender to the touch, are observed and these are usually accompanied by a moderate fever It has been noted by Moorehead and Abrahamson (1928) that thrombosis of the veins of the internal viscera [illegible] when the veins are affected (Foote, 1949)

AETIOLOGY

The aetiology of thrombophlebitis migrans is obscure Debility, substandard [illegible]

This possibility receives some support from the observations of Harkavy (1933) who found skin sensitivity to tobacco in some of his patients Severe injuries which result in internal bruising especially blows on the chest, are the cause of the disease in some cases It is probable that more than one factor is involved Thus, in a patient who has suffered a severe injury, the extravasation of blood causes an

outpouring of platelets, and if this patient has a thrombophilic tendency of which there may be evidence in his family or past history, thrombophlebitis is likely to result The presence of varicose veins does not seem to predispose to this disease

TREATMENT

General

The patient requires reassurance and a sanguine outlook, because he is generally afraid of embolism and has the possibility of sudden death or of a long period of invalidism in his mind He should be made to understand that the ultimate prognosis is favourable although in some cases the disease may take a prolonged course Rest in bed for the first few days at least is advised Temperature, pulse and respiration rates should be taken 4 hourly and the patient should be kept in bed until the temperature has been at a steady subnormal for a few days If at this time the thrombophlebitis is limited to superficial veins and the temperature remains normal the patient is allowed up in his bedroom and the venous circulation is supported by the application of Elastoplast, elastic or *crêpe* bandages

Medicinal

As a precautionary measure, penicillin, 200 000 units, given intramuscularly 3 times daily for an initial period of 3 or 4 days, is advised If there is fever or if new areas of thrombophlebitis develop the penicillin is given for a longer period If the patient has an infection such as *Bacillus coli* infection of the urinary tract, sulphacetamide, 4-hourly by mouth, is given instead of penicillin

Treatment of Incidental Sepsis

During the foregoing treatment obvious sepsis should be dealt with, for instance, a urinary infection can be treated and gingivitis and gum pockets can be dealt with When the disease is healed or is in a quiescent phase, more radical measures designed to remove focal sepsis can be undertaken

Vaccine Therapy

With treatment on the above lines, the disease rarely continues with recurring attacks of thrombophlebitis persisting over several months, as not infrequently happened in the past If, however, a migrating phlebitis continues in spite of treatment a course of autogenous vaccine is advised (*see* Antigen Therapy, page 54)

Abstinence from Tobacco

The patient is advised to give up tobacco smoking altogether It is of little or no advantage to cut down smoking because the bad effects of tobacco smoking if they exist, are due to hypersensitivity and not to excess

Surgical

When the disease is associated with varicose veins a high resection of the internal saphenous vein may be indicated

Anticoagulant Therapy

Dicoumarol and heparin have no place in the treatment of the ordinary case They are called into use, however, if embolism occurs According to Barker (1934

1936), some 12 per cent of cases may show this complication Another possible use of the anticoagulant drugs is in those cases in which frequent recurrences of the disease are present

NERVE BLOCK

There is reason to believe that the extension of thrombus formation along the course of the saphenous veins is accelerated by spasm of the vein walls It is, therefore advised by those who have experience of the treatment that in suitable cases a nerve block should be done by a deep injection of procaine solution into the second, third and fourth lumbar ganglia on the affected side

SUMMARY

To summarize, although treatment is of an empirical nature, the disease can be controlled and recurrences may be prevented in the majority of cases if septic foci are eradicated and if the general treatment described above is carried out From the point of view of both prognosis and treatment it is essential that an exact diagnosis is made and that the commonly present thrombo-angiitis obliterans is excluded

Barker, N W (1934) *Med Clin N Amer* 18 597
(1936) [illegible]

VARICOSE ULCERATION AND VARICOSE ECZEMA

AETIOLOGY

Both eczema and ulceration result from chronic venous stasis, and varicose ulcers are frequently termed stasis ulcers or gravitational ulcers These incapacitating conditions are caused by severe varicose veins in which the valves have become incompetent, by a thrombosis of the deep veins of the leg or by a combination of these two factors

TREATMENT OF ULCERATION

The presence of ulceration is generally due to insufficient treatment, because both varicose eczema and varicose ulceration can be prevented or if present they can generally be cured, if the correct treatment is prescribed and if the patient will give full co-operation

The principles of treatment are adequate supportive measures and removal of the effect of gravity on the veins as far as is possible (Foote 1949)

SURGICAL

Treatment of the group comprising those patients with ulceration due to severe varices only and in whom the deep veins are satisfactory, is surgical A few days in bed is advisable in order to cleanse the ulcer Hot applications to the ulcer and an

extensive raising of the foot of the bed (usually on 8 inch wooden blocks) are all that is required Leg exercises must be carried out every few hours in order to avoid the risk of a deep vein thrombosis A high resection operation of the internal saphenous vein followed by ambulatory treatment of the patient and compression treatment of the leg will effect a cure in most cases

Fig 34 —A case of severe varicose eczema

COMPRESSION

In the second group of patients with ulceration due to a deep vein blockage resulting from a previous "white leg' or deep vein thrombophlebitis, compression treatment will cause healing The treatment is best carried out in a special clinic for varicose veins, because it requires considerable experience to make the proper selection of patients and the best use of the various supports available Those in common use are the *Elastoplast*, the *Ceraban bandage*, the Diachylon Elastocrêpe bandage, the Viscopaste bandage, the Ichthopaste ban

be provided when required by means of pads of felt or of Sorbo rubber The general principle in the proper application of these bandages was well described by Sir Benjamin Brodie more than a hundred years ago (Brodie, 1846)

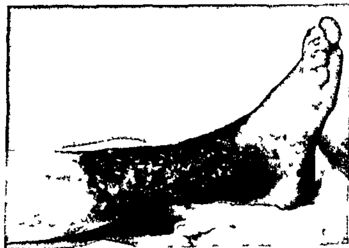


Fig 35 —A severe annular varicose ulcer

Firm compression from the toes to the knee gradually relaxing the amount of

The sticky bandage of the

gence because they find it

indage The latter type of

ght, it allows a bath to be
taken and it permits the use of medicaments which can be applied daily The nauseous smell of the discharge seeping through the sticky type of bandage is avoided, and it is generally more comfortable

The Ceraban bandage or the Diachylon Elastocrêpe bandage is of especial use for patients who are allergic to the Elastoplast type of bandage Viscopaste,

table for the markedly oedematous

ulcers but they should only be used for a short time Medicaments on an ulcer bed are of little importance provided proper compression treatment is given Penicillin, sulphonamides and gentian violet have an occasional use

TREATMENT OF VARICOSE ECZEMA

The same principles as have been described for the treatment of ulceration apply to the treatment of varicose eczema In eczema, however, associated with pruritus and discharge, certain local applications have a place, and may be used under the compression bandages Prescriptions for these substances are given below but the writer once again points out that local applications are of minor importance compared with the treatment of the causal venous stasis which is the first objective

LOCAL APPLICATIONS

Crude coal tar ointment —A crude coal tar ointment, which is antipruritic, emollient and antiseptic, is composed of

Crude coal tar	60 gr	4 g
Zinc oxide	60 gr	4 g
Vaseline	½ oz	15 g
Lanolin	½ oz	15 g

Penicillin ointment —This ointment is of use only in those cases which have become secondarily infected by staphylococci and by other penicillin sensitive micro organisms In such cases penicillin given intramuscularly is of greater value

Gentian violet —Gentian violet is made up as a 2 per cent aqueous solution It is

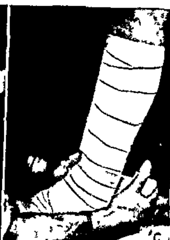
Intolerance to this solution may occur

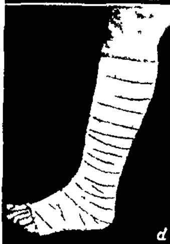
Crude cod liver oil —This may be applied to the dry, scaly type of eczema

Anethaine Ointment —Anethaine Ointment (Amethocaine 1 0 per cent in non-greasy ointment base) is of great value in severe pruritus which may interfere with sleep Frequent applications for a few days will afford great relief in some cases

















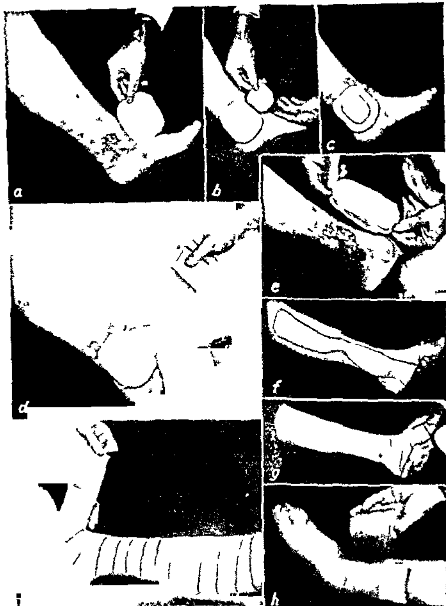
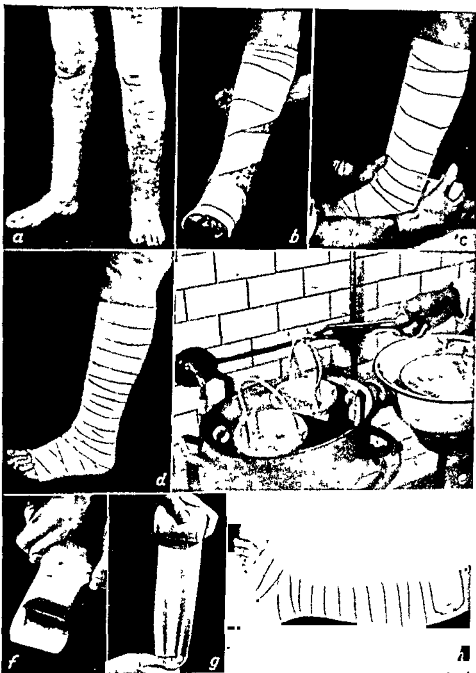


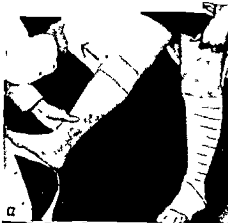
FIG 37 —(*a*) the first stage of the local compression treatment of a malleolar ulcer Note the chamfered edges of the adhesive felt pad. (*b*) the application of the second felt pad, (*c*) felt pads in position (*d*) the application of a two-way-stretch bandage over the pads. In certain cases, this bandage might be replaced by an elastic adhesive bandage or by the use of a Diachylon bandage (*e*) an indurated ulcer surrounded by a large area of eczema and soggy skin, which is



... stages be treated with



Fi 27 ... he ... f ...


a


b

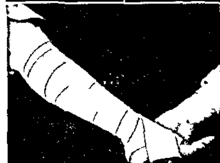

c

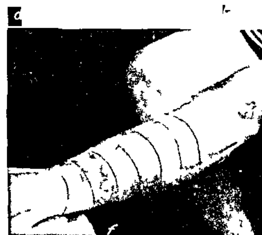



e


f






Eusol solution —Eusol solution (solution of chlorinated lime with boric acid) is valuable in the form of compresses (without waterproof covering), both for eczema and for cleaning up septic ulceration It is used warm in full strength or diluted with an equal quantity of tap water

Sulphonamide ointments —Sulphonamide ointments find little place in the treatment of either eczema or of ulceration but may be of value on occasions The practitioner must always be on the look out for skin sensitization when using these ointments

Brodie, B C (1846) *Lectures Illustrative of Various Subjects in Pathology and Surgery* London, Longmans, Green
Foote, R Rowden (1944) *Varicose Veins, Haemorrhoids and other conditions* London, Lewis
— (1947) *Practitioner*, 158, 60
— (1949) *Varicose Veins* London, Butterworth

VARICOSE VEINS

INTRODUCTION

Varicose disease of the veins is a progressive degenerative process, characterized by dilatation, elongation, tortuosity, diminished elasticity and variable thickness of the vein wall For all practical purposes it concerns only the veins of the lower extremities though veins in other parts of the body may be similarly affected

It is estimated that some 10 per cent of the population of Great Britain have varicose veins Varicose veins are in themselves a cause of fatigue and of sub standard health, while the complications of varices are a common cause of absenteeism from work, and they may indeed make the patient a chronic invalid The treatment of varices can be traced back to the days of Hippocrates, since when acupuncture, injections of sclerotics and various surgical operations have been methods of treatment

TREATMENT

Whatever treatment is given to varices, it is never possible to restore the normal physiology of the venous system of the leg, also the recurrence rate after any form of treatment must always be borne in mind

INDICATIONS

Treatment is indicated for the relief of symptoms such as heavy, aching limbs associated with oedema, for the prevention of complications such as eczema ulceration, phlebitis and haemorrhage for compliance with certain regulations of such authorities as the Post Office and the Services, and for cosmetic reasons

PROPHYLAXIS

All cases of varicose veins of the lower extremities can be benefited by treatment Prophylactic treatment does not achieve much because the disease tends to be progressive It should be remembered, however, that when there is a family history of varices the patient under consideration is a potential candidate for the disease He should, therefore, choose work which will not entail prolonged standing Further, by early diagnosis, precautions may be taken to prevent undue strain

being placed on the veins Those working in antenatal clinics, for example, should always examine the legs of patients for signs of varicose veins Although the disease is progressive, early treatment will, to some extent, limit its progress

Classification of Patients

Patients with varicose veins fall into three categories for the purpose of treatment Group one consists of severe cases with incompetence of the valves of the internal and the external saphenous veins, or of one of these veins, group two consists of patients with small superficial varices associated with competence of the internal and external saphenous veins, and group three consists of patients with varices associated with a severe degree of obstruction of the deep veins

Patients in Group One

The varicose veins of patients belonging to this group should be treated surgically, because the results of injection treatment are disappointing, the recurrence rate within a 5 year period being perhaps as much as 80 per cent The present day surgical treatment is high ligation of the saphenous vein combined with injection of

diagnosing incompetence of the valves of the main saphenous system the reader is *referred to the author's monograph on the subject (Foote, 1949)*

Patients in Group Two

When the valves of the internal or external saphenous veins are competent, injection therapy is advised It must be realized, however, that the recurrence rate after this treatment may be as high as 70 per cent Nevertheless, during the time that the veins are sclerosed the patient is benefited and such improvement may last for a considerable period

Even those veins which show a rapid recurrence are frequently left in a thickened ... previously com- ... ner and

Equipment for injection treatment

No special equipment is needed for the treatment of varicose veins by injection, *but the following is a list of the usual requirements for the consulting room*

An ordinary examination couch

for giving the injection

A good light An Anglepoise light fitted with an artificial-daylight bulb is the most suitable and efficient

A supply of 2 millilitre, 5 millilitre, and 10 millilitre syringes The all glass type is ideal

kept razor sharp

Elastoplast dressings cut to the size of postage stamps

Recommended solutions for injection

A large variety of solutions have been employed at one time and another in the treatment of varicose veins, but of these only five would seem to be worth mentioning They are as follows

Lithocaine (lithium salicylate, 30 per cent, with Tutocaine, 1 per cent—Maingot's solution)

Monoethanolamine oleate (known under the trade names of Ethamolin, Neo-Varicane, Monolate, and so on)

injury to the intima which is followed by clotting and obliteration of the vein It should not cause untoward local effects such as cramping and sloughs, or untoward general effects such as

best available at the p esent

Lithocaine and sodium salicylate give equally good results, but the former causes less pain Monoethanolamine oleate and sodium morrhuate are both effective, but the use of the former does not appear to be complicated by side effects such as urticaria and alarming collapse which are often experienced with the sodium morrhuate solution These cases of collapse are often of an anaphylactic nature, occurring when a second dose of the solution is used after a long interval In order to minimize this risk, it is wise when the injection treatment has been interrupted for a month or two, to use a different sclerosing agent This applies particularly to the morrhuate class of solution and the precaution should be borne in mind, especially when treating patients for recurrences, since a sensitivity may have developed during the interval The author has for several years avoided the use of sodium morrhuate which, in his opinion involves undue risks

Dosage—Sclerosing solutions tend to cause different quantitative and general reactions in different individuals It is therefore, advisable to give a test dose to each new case, and so to avoid, to a large degree, any unpleasant side-effects Atchley (1942) refers to this testing as the determination of the 'thrombotic index,' or, in other words, the sensitivity of the patient to the dosage given The

safety test doses of monoethanolamine oleate and of quinine are 1 millilitre and ¼ millilitre respectively Lithocaine appears to be sufficiently non toxic to allow of this test being dispensed with so far as a general reaction is concerned

accurate estimate of the dosage for each particular case is best achieved by practice and experience

Monoethanolamine oleate may be injected into several veins or into several parts of the same vein at each sitting a total of 6 millilitres being permissible It is not advisable to inject Lithocaine into two places close together in the same vein, since a leak ulcer may result

Phenol has recently become a most popular sclerosant and is of particular value in the treatment of large varices and as a retrograde injection at the time of operation It is usual to give phenol in a 2 per cent solution in 30 per cent glycerin, but there are modifications of the solution, some operators using a solution which incorporates 30 per cent glucose As much as 10 millilitres may be used at the time of operation, but a not unusual dose for the injection of superficial varices is 2-4 millilitres The local reaction produced is not great, but a firm sclerosis usually results Toxic effects are infrequent, although some patients may complain of slight giddiness or faintness shortly after injection

Position of the patient for injection

The position of the patient depends on whether the 'empty' or 'full' vein technique is to be employed When possible the former is better and the patient is given the injection lying down

The injection

The procedure for injection is as follows The skin is cleansed with surgical spirit The thumb is placed on the skin below the vein to be injected and slight down [illegible]

two punctures are directly opposite each other a leak back may occur By the simple procedure described a valve effect is produced which may save many leak [illegible]

[illegible]

Failure to observe the above precautions may result in the formation of an injection ulcer

When the injection is completed the needle should not be withdrawn for about 10 seconds, and then only if the pressure over the needle is maintained with a swab soaked in spirit A few leak ulcers are avoided if this precaution is followed and particularly if the leg is also slightly raised for a few minutes after the completion of the injection

[illegible]

to the patient

When the patient is discharged, he is advised to carry on with his normal duties but to avoid excessive exertion On no account should he remain in bed

The usual interval between the injections is one week This may, however, be modified according to the reaction shown, the nature of the patient's work and other relative factors

PATIENTS IN GROUP THREE

In the third group of cases, in which varicose veins occur in conjunction with a severe deep vein thrombosis, considerable experience is required regarding a correct selection of treatment If, by means of the use of two way-stretch bandages worn over a period of time, evidence is accumulated that an improved deep vein circulation has occurred or, in other words, a recanalization of the deep vein has either *wholly or partially occurred, then treatment may be given to the superficial varices* with safety This treatment may take the form of either injection treatment or of surgical measures In other words, treatment of varicose veins which are serving no useful purpose in the circulation of the limb can do nothing but good to the patient In those cases, however, in which no improvement in the deep vein circulation can be detected after treatment, conservative supportive measures are all that can be offered to the sufferer These supports are described in the section on [illegible]

stretch *elastic bandage, the stockinet tubular bandage, elastic stockings,* [illegible] light, and the Lastonet stocking

It is often possible to allow the patient the comfort afforded by a light elastic stocking when he is sedentary and to ask him to apply an elastic bandage when standing or walking

R ROWDEN FOOTE

Atchley, R. Q (1942), *J Okla med Ass*, 35, 288
Foote, R Rowden (1949) *Varicose Veins* London, Butterworth

TOXICOLOGY

DRUG REACTIONS

Careful attention should always be paid to a patient s declaration that he cannot take a part cular drug More often than is as yet realized harmful effects may result from the use of drugs apart from those symptoms of overdosage with which all are familiar It is essential that a doctor when prescribing a drug besides knowing its pharmacological action and its beneficial effects should also be fully aware of its possible harmful effects since human beings do not always react with the uniformity of laboratory animals during a physiological experiment

In view of the very large number of proprietary preparations now in general use the possibil ty of a preparation being a mixture of two or more drugs should be remembered great care therefore must be taken to ascertain the nature of the drugs contained in any preparation prescribed

There are two types of serious reaction that may occur namely (a) drug intoler ance and (b) drug idiosyncrasy They are entirely different reactions and either may follow the administration of a drug to an apparently normal person

In drug intolerance or hypersensitivity as it is sometimes called the normal

four times as much as is normally given whereas other patients are so sensitive to the drug that half the usual dose may cause toxic symptoms When using this drug therefore the dosage must be controlled by frequent estimations of the concentra tion of the drug in the blood Other patients acquire a tolerance to drugs as a result of a prolonged administration and common examples of this are alcohol and tobacco Acquired tolerance also occurs in the case of an epileptic who after a long course of treatment can take very large doses of bromide and likewise it may occur in the drug addict who may require a dose that would be fatal if given to a normal person

consist of urt caria oedema rh nitis gastro intestinal upset asthma and collapse Patients who exhibit th s phenomenon are not infrequently allergic subjects suffering from asthma hay fever urticaria or migraine

These two reactions drug intolerance and drug idiosyncrasy are not common but they are extremely important because they may be serious and even fatal, and moreover they are not as widely recognized as they should be

DRUG INTOLERANCE OR HYPERSENSITIVITY

Since in drug intolerance the patient is unable to tolerate the full pharmacopoeial dose, the symptoms, which should be expected, will be those which would occur in

in families Therefore, when prescribing one of the drugs that might have unpleasant results from an overdose, more attention than usual should be given to the history of any previous ill-effects from drugs in the patient or his family

Hypersensitivity is more likely to occur with some drugs than with others, belladonna, iodides and barbiturates are among the more common of these drugs It is therefore wise to follow the rule, that in using drugs liable to be succeeded by hypersensitiveness and abnormal response to very small amounts, treatment should be started with small doses and a careful watch kept for untoward effects, for example, 5 minims of tincture of belladonna or 5 grains of potassium iodide should be the initial dose If no ill-effects result, the dose can be gradually increased in a few days and the desired amount given to the patient within a week of the administration of the first dose

Barbiturates are being used more and more extensively in medicine The consumption of butobarbitone (Soneryl) in 1948 in one large London teaching hospital was 133 500 tablets, and of phenobarbitone over 450 000 tablets in the same year Willcox (1925–26), who was an authority on the possible ill-effects of this group of drugs, wrote "the barbiturates are dangerous poisons, the dangers are not adequately realised at the present time. These drugs are largely advertised to the medical profession as harmless remedies" Intolerance to the barbiturates may show itself by cerebral manifestations, these may include acute or chronic mental confusion and delirium, disordered articulation, ataxia, and even coma followed by a fatal hypostatic pneumonia The writer has seen acute noisy delirium follow the administration of 4½ grains of allobarbitone (Dial) to a young woman, suggesting to the house physician that the patient was suffering from acute encephalitis, when a week later a test dose of only 1½ grains was given to her, exactly the same result occurred and all the patients in the ward spent a sleepless night On at least a dozen occasions patients known to be suffering from a primary

Sometimes the connexion between the unexpected effects of the drug

of cinchophen

Exaggerated effects produced when excretion from the body is diminished (for example in kidney disease) should not be regarded as ordinary intolerance Especial care must be taken in such cases, however, to use small doses at the onset

Tl

DRUG IDIOSYNCRASY

In drug idiosyncrasy the clinical picture is entirely different from that of drug intolerance The symptoms occurring in susceptible persons are allergic manifestations and bear no resemblance to the pharmacological effect of the drug that has been used

Two theories have been advanced to explain this interesting condition Landsteiner and van der Scheer (1933) have produced experimental evidence to show that simple substances such as elemental metals can combine with the tissue

Leeuwen (19

bined with

would not

first use of a drug or it may come on suddenly without any previous warning or reaction during prolonged administration it is also very liable to occur on resumption of treatment by a drug after an interval Rolleston (1927) has pointed out that the treatment of each patient is a new problem for he or she is a complicated organism reacting in their own way to a stimulus and not a machine out of order

Witts (1936) has shown that this peculiar property of drug idiosyncrasy makes

harmful effects can be properly assessed

Some individuals will show the same abnormal effects after taking different drugs and these effects tend to be the same for that particular individual If therefore during treatment a patient complains for example of acute rhinorrhoea on more than one occasion it might be well to ask oneself if it has any connexion with the medicine he has been taking Care must therefore be taken if a patient gives a history of any reaction to any drug taken previously or if any relative gives a similar history since drug idiosyncrasy may occur in members of the same family Allergic subjects such as those suffering from asthma vasomotor rhinitis eczema epilepsy and migraine are particularly prone to develop drug idiosyncrasy Skin

prevention of this condition

It is possible that drug idiosyncrasy and drug intolerance can occur in the same patient The writer has seen one patient, who developed vasomotor rhinitis and

muscular pains on two occasions after injections of penicillin and these symptoms were attributed to drug idiosyncrasy, the same patient was known to be extremely susceptible to very small doses of morphine, purgatives and alcohol

The reaction may be slight or so severe as to result in death There may be various rashes, urticaria, oedema of the face and genitals and of mucous membranes such as lips, tongue and glottis, running of the nose often accompanied by sneezing, and sometimes generalized pruritus, less commonly the patient may develop eczema, asthma or fever, the last mentioned sometimes presenting as a pyrexia of uncertain origin and giving rise to considerable anxiety.

Whilst idiosyncrasy may occur in response to almost any medicament used in treatment, there are certain substances, often used with great beneficial effect, that not infrequently may cause severe and sometimes fatal results Among such drugs are aspirin, various coal-tar derivatives and drugs containing a phenyl grouping arsenic (organic and inorganic), quinine, opiates and morphine, cocaine, ipecacuanha, iodides and bromides

It has long been known that some patients cannot tolerate aspirin, gastric dis- [illegible]

[illegible]

tablets Van Leeuwen (1924–25) records 14 cases of asthma occurring after taking aspirin, including one after as small a dose as 0 5 gramme (7½ grains)

Whilst it is well known that morphine may produce a series of unpleasant symp toms such as vomiting, it should also be remembered that morphine, given to a patient known to be the subject of asthma, may produce a severe and even fatal attack of asthma Unger (1945) writes that morphine is "undoubtedly the chief cause of [illegible]
from th [illegible]
history [illegible]
it is neither wise nor safe to attempt to confirm the patient's statement either by administering the drug in question or by carrying out tests to demonstrate sen sitivity to the drug The only safe procedure is to accept the patient's considered story The drug must not be given under any circumstances" It should be emphasized, therefore, that in dealing with asthmatical subjects particular care should be taken in prescribing frequently used drugs such as aspirin and morphine

Acquired sensitization is most likely to occur when the use of a drug has been discontinued for a period of time and then resumed, but it may also suddenly appear during prolonged employment of a drug Yeo, as long ago as 1889, recorded his own experiences with the use of quinine He had frequently taken quinine before, and then he suddenly developed an idiosyncrasy to it after very small doses Having [illegible]

seen also with cinchophen and Sedormid It is, therefore, most important when using these potentially dangerous drugs over a long period that watch should be kept for any development of such an acquired sensitivity

Toxic reactions sometimes occur due to an impurity in the preparation and not to the drug itself Duke (1927) quotes the case of a man who was sensitive to one

brand was used Two patients have complained to the writer of yellow vision whilst taking digitalis one when being given Nativelle s Granules of Digitaline and the

plained of a return of yellow vision eliminating any question of neurosis

organs These dyscrasias include agranulocytosis thrombocytopenic purpura and aplastic anaemia any of which may endanger the life of the patient and may occur during the normal therapeutic use of certain drugs They may occur with little

ons such as
the admini
nay produce

time The warning symptoms are a sore throat unexplained fever a rash and a feeling of malaise and asthenia As soon as these appear a leucocyte count should at once be carried out and if there is any leucopenia the drug must at once be dis continued When a drug known to produce agranulocytosis is being used over a long period of time or in large quantity it is advisable to have frequent leucocyte counts carried out

Cases of thrombocytopenia with purpura haemorrhagica have not infrequently

the thrombocytes the drug must be discontinued without delay

Aplastic anaemia is a well known but fortunately uncommon complication of
sias
that

CONCLUSIONS

In the daily practice of medicine hundreds of patients will be given medicine

without any untoward effects Nevertheless, "what is one man's meat is another man's poison"

drug or a proprietary preparation

POISONING

In dealing with a case of poisoning, it is essential that treatment should be started without delay At the same time it is *important that all glasses, bottles, and prescriptions should be examined and carefully preserved* This will assist in the diagnosis and treatment of the patient, and will also be of value in any subsequent inquiry that may have to be made

The methods of treatment are (1) Elimination of the poison, by (a) stomach wash-outs, or (b) emetics (2) Use of antidotes, (a) chemical, or (b) pharmacological (3) Administration of demulcents (4) General and symptomatic treatment

Elimination of the Poison

Stomach wash out—A stomach wash-out is the most reliable and effective ... be used in cases of ... r phenol derivatives ... y new, rubber tube should be used, since the gastric mucous membrane is very friable

The wash-out should be done carefully, but thoroughly, using large amounts of warm water or saline

Emetics—When the apparatus for a stomach wash out is not available or if such a procedure is contra indicated, an emetic should be given If the poison is of such a nature that it can be neutralized, this must be done before giving the emetic (*see* Table)

It should be emphasized that an emetic (other than apomorphine) is not so reliable as a stomach wash-out, as it is often slow and uncertain in action, *but it is* more easily obtained and administered

The following are the most useful emetics

(a) Common salt—Two tablespoonfuls in a tumbler of water, repeated if necessary

(b) Mustard—One tablespoonful, made into a paste, and given in a tumbler of warm water

(c) Zinc sulphate—*Thirty grains in 4 ounces of warm water*

(d) Copper sulphate—*Ten grains in 4 ounces of warm water*

(e) Ammonium carbonate—Thirty grains in 4 ounces of warm water

(f) Ipecacuanha—Thirty grains of the powder in 4 ounces of warm water, or 1 ounce of the tincture

(g) Antimony and potassium tartrate (tartar emetic)—From ½ to 1 grain This is ... To prevent

the patient by producing retching and vomiting for $\frac{3}{4}$–1 hour, its use should be reserved for cases of coma and of acute alcoholic intoxication, or when other emetics have failed

If none of the above is readily available, copious draughts of warm water or tickling the back of the fauces should be tried

Any contents of the stomach that may be vomited or that may be obtained by the first stomach wash out must be saved for subsequent analysis In certain cases

USE OF ANTIDOTES

Before considering the antidote it is necessary to know the nature of the poison that has been taken by the patient If the poison can be neutralized in the stomach, the appropriate antidote is given at once before the stomach wash out or emetic, and some of it may be left in after the wash out In other cases, especially with pharmacological antidotes, the antidote is given by injection The Table at the end of this article should be consulted for antidotes to the different poisons

ADMINISTRATION OF DEMULCENTS

Demulcents should be administered to soothe the irritated mucous membrane and should preferably be given warm after the poison has been removed from the stomach, warm drinks are more comforting to the patient and also help to reduce shock

GENERAL AND SYMPTOMATIC TREATMENT

The patient should be put into a warm bed and kept warm by hot water bottles, electric blankets and the like, care should be taken not to burn him if he is unconscious Shock should be treated in the usual way, and morphine given to relieve severe pain

A general stimulant, such as 5–10 ounces of hot, strong black coffee, or strong tea, or 1–2 ounces of brandy, is often required In addition, if there is circulatory or respiratory failure, the administration of sal volatile, 1–2 teaspoonfuls in 1 ounce of water, or the inhalation of smelling salts or of ammonia (obtainable in glass capsules) may be of some value, other useful remedies are ether, 30–60 minims hypodermically, strychnine, $\frac{1}{32}$–$\frac{1}{8}$ grain hypodermically, or nikethamide (Coramine), 1–2 millilitres intramuscularly

In conclusion, a careful watch should be kept on the patient's pulse and respiration and general condition, in case of any relapse He should not be left alone until well on the way to recovery Although poisoning is often accidental, it must be remembered that it may be criminal, therefore in the event of the death of the patient, the Coroner should be informed as soon as possible

KENNETH E HARRIS

Kaum, M. (1938) *Arch. derm. Syph*, 37, 787.
Landsteiner, K., and van der Scheer, J. (1933). *J exp. med*, 57, 633.
. rubner,

TABLE

TREATMENT AND ANTIDOTES FOR THE MOST COMMON FORMS OF POISONS
(For rare types of poisoning, reference can be made to Martindale's *Extra Pharmacopoeia*)

Poison	Treatment	Antidotes
Acid, Carbolic Lysol Coal tar disinfectant	piration, treat shock by warmth, etc; give ½ oz of magnesium sulphate or sodium sulphate	
Acid, Hydrocyanic Prussic acid Potassium cyanide	Great speed is necessary as this poison	Give immediate inhalations of amyl nitrite, inject into a vein as soon as possible 10 ml of 3 per cent sodium nitrite, followed by 50 ml of 25 per cent sodium thiosulphate, repeat injections in 2 hours, if necessary, using half dosage
Acids, Mineral Hydrochloric acid Spirits of salts Nitric acid Sulphuric acid Oil of vitriol		Magnesium oxide, calcium carbonate, whitening, chalk, sodium carbonate (washing soda), wallplaster
Acid, Oxalic Salts of lemon or sorrel Acetic acid and other organic acids		Calcium carbonate, whitening; chalk, wallplaster; lime water.

Treatment and Antidotes—*cont*

Poison	Treatment	Antidotes
Aconite	[illegible]	
Alcohol	Stomach wash-out or emetic, using apomorphine ($\frac{1}{10}$ gr), *if coma is present* or imminent apply cold water to face and back of neck, to rouse the patient, stimulants—strong black coffee should be left in the stomach after lavage; administer oxygen for cyanosis, artificial respiration	
Alkalis Caustic soda Caustic potash Ammonia	[illegible]	Vinegar; lemon juice; citric acid, tartaric acid ($\frac{1}{2}$ dr in $\frac{1}{2}$ pint of water)
Antimony Butter of antimony *Tartar emetic*	Encourage vomiting, a prominent symptom, by draughts of tepid water, stomach wash-out or *emetic* (usually unnecessary) keep lying flat stimulants demulcents, give morphine ($\frac{1}{6}$–$\frac{1}{4}$ gr) for pain, treat shock by warmth, etc	Tannic acid (60 gr) or glycerin of tannic acid (2 *dr*), *or strong tea to* form insoluble antimony tannate
Arsenic	[illegible] of the gut	[illegible] of ammonia or bicarbonate of soda) or 2 oz. dialysed iron to form insoluble ferric arsenate
Aspirin	Stomach wash-out or emetic, stimulants, give intravenous saline solution to assist elimination	
Atropine Belladonna Deadly nightshade Hyoscyamus	Stomach wash-out or emetic; stimulants give morphine ($\frac{1}{4}$ gr) for delirium, artificial respiration	Pilocarpine ($\frac{1}{8}$–$\frac{1}{4}$ gr) hypodermically and repeat in 2 hours if necessary

Treatment and Antidotes—cont.

Poison	Treatment	Antidotes
Barbiturates Barbitone Veronal Medinal Phenobarbitone Luminal Dial Sulphonal Nembutal	[illegible] lapse, and repeat as required, administer oxygen for cyanosis, artificial respiration, treat shock by warmth, etc	Only in deep coma, give picrotoxin (3–10 mg 3–10 ml of 1 : 1,000 solution) intravenously every hour until patient rouses *N B* Dangerous remedy, for use only in extreme cases
Chloral hydrate	Stomach wash-out or emetic; if conscious, rouse patient by cold douches, stimulants, administer oxygen for cyanosis, artificial respiration, keep lying flat, and warm	
Cocaine	Stomach wash-out or emetic (if taken by mouth), give inhalations of chloroform for convulsions, stimulants, administer oxygen for cyanosis, artificial respiration	
Copper Blue vitriol Verdigris	[illegible] before emetic [illegible]	Potassium ferrocyanide (1 dr) in water
Digitalis	Stomach wash-out or emetic; stimulants, keep lying flat	Tannin (10 gr in 2 oz. of water), *or large draughts* of strong tea
Gases, Poisonous Carbon dioxide Carbon monoxide Coal gas Sewer gas Pit gas *Marsh gas* *Hydrogen bisulphide*	[illegible] at once to the fresh air [illegible] section, followed by blood [illegible], may be tried	
Iodine	Stomach wash-out or emetic; demulcents, give morphine ($\frac{1}{8}$–$\frac{1}{4}$ gr) for pain	Give large amounts of arrowroot or other forms of starch (e g *bread, flour,* boiled potatoes)

Treatment and Antidotes—*cont*

Poison	Treatment	Antidotes
Lead	Stomach wash-out, using magnesium sulphate or *sodium sulphate, or emetic;* demulcents, relieve colic by morphine (1/8–1/4 gr), and atropine (1/150–1/100 gr), or by opiates, give a brisk purge	Magnesium sulphate (1/2 oz) *sodium sulphate* (1/2 oz.) to form insoluble lead sulphate
Mercury Corrosive sublimate White or Red precipitate Mersalyl	Stomach wash-out or emetic, stimulants, demulcents, give tincture of opium (30 min) to relieve pain and *purging treat* shock by warmth, etc., give fluids freely	Give at once whites of eggs, or albumin water, *to form insoluble mercury* albuminate
Morphine Opium Laudanum Paregoric Nepenthe Chlorodyne Dover's powders Codeine Papaveretum Heroin		Atropine sulphate (1/50 gr) hypodermically
Phenacetin Acetanilide Antifebrin Phenazone Antipyrine Amidopyrine Pyramidon	Stomach wash out or emetic stimulants, using strychnine (1/30–1/8 gr) hypodermically; keep lying flat, give intravenous saline to assist elimination administer *oxygen for cyanosis, artificial respiration*	
Phosphorus	Stomach wash-out or emetic; demulcents (but *not* olive oil or fats) give morphine (1/4–1/2 gr) for pain, give 1/2 oz magnesium sulphate as a purge	Wash out stomach with potassium permanganate (1 gr to 1 oz.) to oxidize phosphorus, and leave 10 oz. in stomach, give old or oxidized oil of turpentine (40 min emulsified *in mucilage and water* to 1 oz.) every 1/4 hour.
Snake-Bites	stimulants	anti-venom serum *podermically or in*-travenously

Treatment and Antidotes—*cont*

Poison	Treatment	Antidotes
Strychnine Nux vomica	[illegible] Sodium) (7½–15 gr) intravenously, [illegible] spiration	
Turpentine	Stomach wash-out or emetic, demulcents, give morphine ($\frac{1}{6}$–$\frac{1}{4}$ gr) for pain, give 1 oz. magnesium sulphate or castor oil as a purge	
Zinc	Encourage vomiting by giving copious [illegible]	Sodium carbonate (washing soda) in large *amounts to form insoluble* zinc carbonate

TROPICAL DISEASES

AMOEBIASIS

DEFINITION

Amoebiasis is a state of parasitization of the large intestine with the protozoan parasite *Entamoeba histolytica* It is prevalent throughout the world, and particularly so in the warmer regions with bad sanitation, where flies abound Intestinal infesta-

genous amoebic dysentery is rare Frank dysentery is commonly the result of infestation in the tropics, rather than in the temperate zones In these dysenteric patients, relapsing diarrhoea, with the passage of blood and mucus, may persist for years in the untreated case Direct extension of the infection to neighbouring organs

treated

TREATMENT

Prophylactic

Infection results solely from ingesting the cysts passed in the formed stools of per-

with this and other intestinal protozoan parasites No vaccine or drug protection can, in practice, be used to forestall amoebic dysenteric infection.

General

The patient suffering from an attack or relapse of amoebic dysentery is rarely acutely ill The diarrhoea is not very severe, rarely more than about a dozen motions being

rigid isolation

With rest in bed, warmth, and a readily assimilable diet, attacks of amoebic dysentery may subside spontaneously There is no need to restrict the diet unduly, but indigestible matter should be excluded from it A liberal nourishing diet will increase resistance and assist the patient to control the infection Very hot or iced drinks, spiced foods, and alcoholic liquors should be avoided, for these cause exacerbation of the diarrhoea

SPECIFIC

Ipecacuanha and its alkaloid, emetine

For over three centuries ipecacuanha has been a reputed specific for dysentery On its introduction to Europe from South America, ipecacuanha was used empirically in the treatment of all forms of dysentery In 1817 Pelletier and Magendie isolated from it an alkaloidal principle which they called emetine Subsequently it was shown that there are five alkaloids in ipecacuanha In 1903 the parasite *E histolytica* was identified by Schaudinn, and amoebic dysentery was thereafter recognized as a clinical entity due to infestation with it In 1912 Rogers demonstrated the specific action of emetine in this disease Since then emetine, in one form or another, has been employed as an essential component in nearly all forms of treatment for amoebiasis

McVay, Laird and Sprunt (1949) have briefly reported that intestinal infections with *E histolytica* were eradicated by aureomycin treatment in the fourteen cases treated by them This preliminary observation, if confirmed, is of obvious importance in its bearing on the future treatment of amoebiasis

Treatment of the acute attack

Daily injections of 1 grain (65 milligrams) of emetine hydrochloride, subcutaneously or intramuscularly, will rapidly arrest a clinical attack of amoebic dysentery A patient who is receiving emetine injections must be confined to bed in view of their depressant action on the heart There is no purpose in continuing the injections after the dysentery has subsided, for emetine alone will rarely sterilize the intestinal [illegible] In no case should [illegible] st be [illegible] nical [illegible]

Sterilization of the infection

To eradicate the intestinal amoebic infection it is usual to administer a combina[illegible] which has some action on the parasites [illegible] iven over an adequate period, is more [illegible] of any single one of them The drugs commonly employed in combined treatment can be divided into the following groups

Emetine preparations for oral administration—These include emetine bismuth iodide (E B I), Auremetine, emetine periodide, and emetine hydrochloride In view of their emetic effect, emetine preparations are given in gelatin capsules, or in enteric-coated pills, to prevent their liberation until they have passed well down the bowel Pills may fail to liberate their contents and are then ineffective The daily dose of E B I is 0 2 gramme, and this is repeated on up to 12 occasions If

used in gelatin capsules it is usually given as a single dose at bed-time, after a sedative, such as phenobarbitone, 1 grain, to reduce the tendency to vomit which

enema, and is best employed in this way Vioform (iodochlorhydroxyquinoline),

the drug, 3 or 4 are given 8 hourly

Trivalent arsenicals for oral or rectal administration —Acetarsol (*B P*) (acetyl-

these arsenical compounds

Bismuth salts for oral administration —For many years bismuth salts have been thought to exert some action on amoebae in the intestine; indeed, bismuth subnitrate (Panama bismuth) in conjunction with emetine was claimed in Central America to be curative Bismuth is still used in conjunction with other drugs in some courses

individual preference and experience In view of the chronicity and tendency to relapse of an amoebic infection, and of the serious complications to which it may give rise, thorough treatment is very desirable Unsuccessful courses of treatment

ized for the purpose The question arises as to the necessity for treatment of an

course

A "combined" course of treatment, lasting 3 weeks, which has proved to be effective in sterilizing many cases of amoebic dysentery of the intestinal parasitization is as follows

On the first, third, fifth and the succeeding odd days of the course

Auremetine Slipules 1 grain (65 milligrams) 8 hourly

Bismuth carbonate 60 grains (4 0 grammes) in milk or soda water 8 hourly

On the second, fourth, sixth and succeeding even days of the course

8 a m A rectal wash-out with 2 per cent sodium bicarbonate to remove faecal matter and mucus

9 a m The foot of the bed is raised, and a retention enema of 2 per cent chiniofon is run in through a funnel and a catheter, the amount being such as to enable the patient to retain it for *at least* 6 hours Initially 6 ounces are given, in some patients this may ultimately be increased to 30 ounces or more and the solution increased to 4 per cent

Acetarsol tablets 0 25 gramme 8 hourly

Bismuth carbonate 60 grains (4 0 grammes) in milk or soda water 8 hourly

Throughout the course of treatment the patient is confined to bed for the whole of each day on which he has his retention enema He is allowed up on the intervening days

Diet throughout the treatment is normal, but unassimilable and indigestible foods are to be avoided

Treatment of Complications

Associated bacterial colitis

When pus is found on microscopical examination of the stools, it constitutes

prostration in severe cases In the presence of this complicating infection the para*sitic infection is said to be more difficult to eradicate than in the case of an un*complicated amoebic infection The administration of one of the sulphonamide drugs or of penicillin may control the concomitant bacillary infection Sulfasuxi- doses days he sul

phonamide preparations An initial dose of 100,000 units of penicillin intramuscularly, followed by 33,000 units 3-hourly until up to 2,000 000 units have been given, has been recommended in such cases by Hargreaves (Adams, Hargreaves, and others, 1945) The intensity of the bacillary infection may thus be reduced *and the patient's condition correspondingly improved,* but this will not be found invariably to be the case Neither the sulphonamides nor penicillin can exert any direct action on the parasitic infection

Extra intestinal amoebic infections

Infections of the liver —The most common of these extra-intestinal amoebic infections is amoebic infection of the liver by embolic spread through the portal circulation The lesion essentially consists of a colony of amoebae in an area of lysed liver tissue, which steadily increases in bulk as the parasites continue to invade the surrounding liver There is no true pus formation, and there is no specific cellular reaction or tumour formation in the hepatic tissue The amoebae in the

liver can usually be destroyed by intramuscular injections of 1 grain (65 milligrams) of emetine hydrochloride daily for 12 days When they are eradicated the destroyed liver tissue is usually absorbed and replaced, and the lesion vanishes On rare occasions the amount of destruction is so great that surgical drainage becomes necessary, but this should not be undertaken hastily Surprisingly large amoebic abscesses are resolved without mechanical interference when the causative parasites have been destroyed Repeated aspiration through a large bore needle may be attempted if a large lesion does not resolve satisfactorily This procedure was found to be adequate in India when the mortality from open operation was abnormally high Under more satisfactory conditions for surgery, open drainage is preferable to repeated aspiration, the nature of the operation will depend on the site and the extent of the abscess There is nothing to be gained by the introduction of emetine solutions into an abscess cavity on these occasions A secondary bacterial infection of an amoebic liver abscess may occur spontaneously, or as a result of interference, and early open drainage is then necessary

The peripheral extension of an amoebic abscess of the liver, unchecked by specific treatment, leads to its impingement on neighbouring organs or structures This extension commonly involves the diaphragm, which is traversed, and the abscess extends into the chest, less commonly it is the anterior abdominal wall, or another abdominal organ, which is invaded The direction of the extension is dependent on the anatomical position of the abscess in the liver

Infection of the peritoneum —Direct extension of an intestinal amoebic infection through the wall of the large bowel into the peritoneum, or into a neighbouring organ or structure in the abdomen, is usually associated with an accompanying bacterial infection, and an inflammatory tumour (amoeboma) results If the amoebae in this lesion are destroyed by a 12 day course of emetine hydrochloride,

have to be made to surgery

Concomitant treatment of primary and secondary infections —Although the extra-intestinal infections, whether in the liver or elsewhere, are readily sterilized by [illegible]

primary infection continues and the secondary extensions may recur

Adams A R D, Hargreaves W H, and others (1945) *Trans R Soc trop Med Hyg* 38 237
McVay L V, Laird, R L and Sprunt D H (1949) *Science*, 109, 590
Pelletier, J, and Magendie, F (1817) *Ann Chim (Phys)* 4 172
Rogers L (1912) *Brit med J*, 1 1424
Schaudinn F (1903) *Arb GesundhAmt*, *Berl*, 19, 547

BLACKWATER FEVER

DEFINITION AND COURSE

Chronic, inadequately treated, malignant subtertian (*Plasmodium falciparum*) malaria in some cases may be associated with sudden haemolysis of a proportion of

the circulating red cells This acute intravascular haemolysis rarely occurs in less than a year after infection Its onset is unheralded and its advent is unassociated with clinical or parasitic relapse of the malaria infection It may be a single event but commonly is repeated, often at brief intervals over several days The degree of haemolysis varies greatly from case to case, and its mechanism is unknown The condition takes its name from the appearance of the blood pigments voided in solution in the urine The mortality from blackwater fever is high one in five dying from it Death as a direct result of the attack commonly occurs before the sixth day of the disease

TREATMENT

PROPHYLACTIC

As blackwater fever is a complication of a continuing inadequately controlled

these repeated clinical or subclinical relapses of subtertian malaria which lead to the development of blackwater fever

GENERAL

very gravely ll They must

pulse rate must be charted every two hours All specimens of urine passed shou

and the fl d ntake must be charted Haemo

—several times a day

rding the progress of

the disease

Continuous vomiting should be checked by any means possible Sucking ice or

the epigastrium and

t may be necessary to

lache may be relieved

be eased by the appli

cation of hot water bottles

Quinine if this is being taken must be stopped at once, there is evidence that this

Quinine in some otherwise

iemoglobinuria If malaria

kwater fever, a course of

n to eradicate them This

vivax) infection It is rare

to persist in the blood in

appreciable numbers after the first day of blackwater fever

Each haemolytic crisis is accompanied by a sharp rise in temperature associated with a rigor, profuse sweating, and vomiting. It is followed by an increase in the amount of blood pigments in the urine. If the waves of haemolysis are separated by intervals of some hours the temperature drops and the urine may temporarily

cent glucose lemonade, possibly with the addition of an alkali such as sodium bicarbonate or sodium citrate (1–2 grammes in 500 millilitres) are suitable. If vomiting prevents the retention and the absorption of fluids by the mouth they must be given by other routes. Glucose-saline solution may be instilled rectally by the drip method, or it may be given by subcutaneous or intravenous injection. The amount of the patient's fluid intake and his output must be carefully recorded; in the event of urinary failure care must be taken not to cause waterlogging by unduly pushing fluids.

COMPLICATIONS

Anuria

Anuria in blackwater fever was thought by Yorke and Nauss (1911) to be due to mechanical blockage of the uriniferous and collecting tubules by the deposition of altered blood pigment. This, they suggested, occurred as a result of a lowered blood pressure and insufficient secretion of water through the kidneys. They advocated a

glomerular filtration, and that upsets in acid–base–electrolyte–water balance were factors in producing these conditions. The tubule blockage they considered to be due to, and not a cause of, the anuria. These views have received support from the recent work by Trueta and his co-workers (1947) and others

patible blood transfusion, in cholera, and in the crush syndrome. As dehydration

and salt loss do occur and lead to ionic imbalance, the administration of copious fluids and of some alkali and salt is beneficial, but the unnecessarily massive alkali dosage once considered desirable is not

Blood transfusion

The question of blood transfusion inevitably arises in any condition in which there is severe anaemia and more particularly when this is progressive, as in blackwater fever Superficially, it would appear that transfusion is indicated, but it is known that during the haemolytic crisis the red cells of the donor as well as those of the patient, are haemolysed Unnecessary transfusion, therefore, may add to the amount of haemolysis, and may embarrass the patient rather than relieve him

requisite from time to time, rather than to give large transfusions It is better to use carefully matched fresh blood than stored blood, as the latter is more likely to promote a reaction which may precipitate further haemolysis When the blackwater fever ceases, even though there may be a severe anaemia, it is probably better not to undertake additional transfusion in view of this risk of precipitating further haemolysis With the arrest of the blood destruction the body usually rapidly makes good the red cell and haemoglobin loss A nutritious easily assimilable diet, and iron preparations, may be given to facilitate this

AFTER-TREATMENT

On cessation of an attack of blackwater fever attention, in every case, must be directed to the malignant subtertian malaria infection primarily responsible for the blackwater state This infection will relapse parasitically and clinically, usually within 2 weeks, if steps are not taken to guard against this eventuality Quinine, in view of its tendency to cause haemoglobinuria, is better avoided Proguanil, or mepacrine, can more safely be employed, and a course of 1 tablet (0 1 gramme) a [illegible] preferably the former, should be begun within [illegible] is course should be continued [illegible] without intermission At the end of this time the primary malaria infection will have disappeared, the risk of blackwater fever no longer remains in the absence of a further subtertian malaria [illegible] arises after an attack of blackwater [illegible] idual [illegible] vail able

Baker S L and Dodds E C (1925) *Brit J exp Path*, 6 247 [illegible] *Med*

CHOLERA

DEFINITION AND MODE OF SPREAD

A specific intestinal infection due to *Vibrio cholerae* cholera is one of the major epidemic diseases affecting man At present it is largely confined to the East particularly India and China where it is periodically responsible for the deaths of a

about 50 per cent Improved sanitation and properly enforced quarantine regula tions have largely obviated its appearance outside the Eastern countries during the last half century

TREATMENT

PROPHYLACTIC

The source of infection being the stools of sufferers from cholera or of convales cents recently recovered from the disease rigid enforcement of sanitation is all important in the control of cholera outbreaks Water is the main vehicle in their spread and attention must be directed to the provision of an uncontaminated

false sense of security The consumption of all unboiled water and uncooked food should be prohibited The fly population must be attacked and foodstuffs protected from flies All infected discharges soiled bed linen and clothing from cases of cholera must be immersed in disinfectant until destroyed or sterilized Convalescents from the disease continue to pass the organisms in their stools for some days after recovery and so should be kept in isolation until free from them

Personal protection is afforded to some degree by vaccine inoculations The use of suitable strains of vibrio in the preparation of the vaccine is of the greatest im portance much of the vaccine employed in the past was ineffective The selection of suitable serological types of vibrio is governed by the types predominant in the area or responsible for a particular epidemic The immunity conferred is not

risk of infection Single inoculation of the whole of the population at risk on the appearance of an epidemic of cholera has reduced the infection rate The immunity engendered by a single inoculation reaches its maximum in about 8 days, and fades

in from 6 months to a year Reinoculation every 3 months is therefore desirable if a reasonable degree of personal protection is to be maintained The mortality rates in those who acquire the disease is not significantly different in the inoculated and the uninoculated

GENERAL

A typical attack of cholera follows a well-defined pattern Initially there is a "*stage of copious evacuations*", *with the loss from the small intestine of pints of fluid* this culminates in a "stage of collapse", primarily due to fluid and electrolyte loss if the patient survives this the "stage of reaction" sets in, with circulatory restoration Death most commonly takes place in the collapse stage but it may occur also in the stage of reaction as a result of continued anuria followed by uraemia, or of *hyperpyrexia*

cholera cases affords the victims the best chance of recovery, and reduces the risk of *spread of the infection to others In view of its acuteness treatment must be prompt* and supervision continuous, nursing attention must be constant throughout the

(0 5 milligram), may be injected subcutaneously for the same purpose Kaolin (200 grammes) in 400 millilitres of water may be given to lessen vomiting and also to absorb toxins Hot water bottles are applied to the body in the early stages to

The rectal temperat re

s in the earliest

diarrhoea in a

ctic against the

disease, which if it did develop, was reduced in severity The mixture he suggested was as follows

Spirit of ether	30 min	2 ml
Oil of anise	5 min	0 3 ml
Oil of cajuput	5 min	0 3 ml
Oil of juniper	5 min	0 3 ml
Aromatic sulphuric acid	15 min	1 ml

This dose is given in ½ ounce (15 millilitres) of water half hourly until the vomiting and purging cease Tomb found it to do so in many cases of cholera after the fifth or sixth dose It has been widely used since, but has not proved as efficacious in other hands

The rational treatment of cholera dates from the development by Sir Leonard

The Rogers treatment is as follows In the first stage, that of evacuation, a hypertonic salt solution (sodium chloride 13·7 grammes, calcium chloride 0.25

if the rectal temperature is subnormal it is given at 102°–104° F, while if the rectal temperature is above 102° F the solution is given at 80° F. The solutions are introduced by cutting down on a collapsed medium basilic vein, into which a cannula is tied The rate of transfusion is 1 pint in 5 minutes, the speed of introduction is reduced as the volume of the pulse returns The treatment is repeated as often as the specific gravity of the blood rises, or when the blood pressure falls to 70 millimetres of mercury or less Restlessness, cramps and cyanosis are indications for transfusion

During the stage of collapse 50 grammes of glucose are added to each 1,000 millilitres of transfused fluids, the alkaline solution should not be used when the urine becomes alkaline or there is other evidence of alkalosis in the form of tetany. As the diarrhoea ceases the solutions may be introduced in 500-millilitre amounts *rectally every 2 hours, this reduces the need for intravenous injections.*

patients it may be due to a continued low blood pressure Pituitary (posterior lobe) extract, or Pitressin in doses of ½–1 millilitre hypodermically at intervals of 6 or 12 hours, caffeine, strophanthin, and ephedrine, have variously been advocated to promote diuresis in such cases It is very probable that the mechanism of the failure of re establishment of urinary secretion in cholera is of the same nature as that encountered in other conditions associated with anuria, such as "crush" syndrome

DRIP TRANSFUSION

At the present time many cases of cholera are treated with continuous intravenous drip transf

or subcutaneously.

Convalescence

After recovery from an attack of cholera convalescence is protracted The diet initially should consist of bland fluids and very readily assimilable matter The return to a normal diet should be slow and gradual

Tomb, J W (1923) *Indian med Gaz*, 58, 257
Rogers, L (1911) *Cholera and its treatment* London, Frowde, Hodder and Stoughton

DENGUE AND SAND-FLY FEVERS

DEFINITION

Dengue and sand fly fevers are acute specific fevers due to filtrable viruses and are conveyed by mosquitoes (*Aëdes*) and by sand flies (*Phlebotomus*), they occur widely throughout the tropics and the subtropics They are of short duration, lasting from a few days to a week, and are unattended by appreciable mortality

[illegible] bones and
[illegible] te in the
[illegible] days, it
may then remit only to recur for a brief period and fall by crisis, so giving the chart a "saddle back" appearance In other cases when the temperature falls initially the fever does not recur There are no serious complications

TREATMENT

Prophylactic

The use of protective clothing and insect repellents will do much to forestall attack by the insect vectors

General

There is no specific treatment for these conditions, and attention is directed [illegible] of the patient and the relief of symptoms Depressant
[illegible] when the temperature falls by
[illegible] be nursed under suitable protective netting to prevent the dissemination of the infection by the local insect vectors

DYSENTERY—BACILLARY

The bacillary dysenteries are encountered all over the world, they present as acute inflammatory conditions of the mucosa of the large bowel and are due to infection with various varieties of *Bacillus dysenteriae* The diseases are especially liable to appear in epidemic form in the tropics and wherever sanitation is defective and flies abound In bacillary dysentery there is no bacteraemia or generalized infection, the organisms being localized in the gut, According to the virulence of the infection changes ranging from a generalized inflammation to widespread
[illegible] Toxaemia is marked, there is
[illegible] rked colic and tenesmus
[illegible] ory exudate Complica

tions remote from the intestine are attributable to the absorption of toxins from the intestine The diagnosis of bacillary dysentery is made on clinical grounds, and is confirmed by bacteriological identification of the causative organisms in the intestinal discharges while the attack lasts

TREATMENT

Prophylactic

The causative organisms are acquired solely from infected human stools, and produce infection only when swallowed Adequate measures must be taken to ensure that sanitation is effective, and that cleanly habits are observed by food handlers All foodstuffs must be protected from flies, which can readily convey the organisms from infected faeces The boiling of all water and thorough cooking of all food must be enforced to sterilize these when contaminated There is no satis-

period This prevents infection, but there are obvious dangers in the uncontrolled adoption of these drugs by laymen

The blood-stained discharge from the bowel of a patient with bacillary dysentery

Flies must be rigidly excluded from the vicinity The disease is liable to spread rapidly throughout a household or institution if these measures do not receive scrupulous attention

General

The short incubation period, due to the very rapid multiplication of the bacilli, and the sudden onset of acute diarrhoea, with the associated fever, toxaemia, and

from the onset

Owing to the fever and to the diarrhoea, sweating and vomiting, the fluid loss is considerable during an attack of bacillary dysentery This is especially evident in

The intraperitoneal administration of saline solution may be necessary; this measure

After the dysentery is ended the large bowel may remain irritable and unduly re active, care should be taken well into convalescence to avoid the consumption of indigestible or irritant foodstuffs Alcohol, particularly in the form of the bulky alcoholic drinks, is better avoided for some weeks or months.

Specific

Up to a few years ago there was no specific treatment for bacillary dysentery

5–10 millilitres intravenously To be of any value it must be given very early in the infection, and repeated over several consecutive days At best it may modify the severity of the attack, but there is little evidence that it reduces the mortality from Shiga infections With the advent of the specific sulphonamide treatment of bacil

Sulphonamides

Sulphaguanidine is absorbed to only a minor extent from the intestine, and is considered to exert its action directly on the organisms within the gut In 1941 Marshall and his colleagues tried it in the treatment of acute bacillary dysentery in children They found it to curtail the attacks within a dramatically short time The

the bacillary dysenteries

except in emergency, unless facilities for ureteral lavage are available Recently Sulfasuxidine (succinylsulphathiazole) and Sulfathalidine (phthalylsulphathiazole) have been introduced (Poth, Beach and Knotts, 1942, Poth, 1943) Both these drugs resemble sulphaguanidine in that they are absorbed to a minor extent from the bowel, and both exert an even greater bacteriostatic action Sulfasuxidine and Sulfathalidine may be given in greater dosage (5 grammes for an adult) than sulphaguanidine as they are even less toxic, but the larger dosage is unnecessary.

COMPLICATIONS

The complications of bacillary dysentery may be either abdominal or systemic The principal abdominal complications, which occur in severe infections, include

usually proves fatal The systemic complications are a result of the absorption of toxins, these produce inflammatory reactions in some tissues A toxic arthritis, peripheral neuritis, or inflammatory eye lesions are common in the bacillary dysenteric infections These lesions never suppurate as they are bacteriologically sterile under suitable palliative treatment they subside without permanent damage to the affected tissues

AFTER-TREATMENT

On recovery from an attack of bacillary dysentery convalescence is short if the disease has been promptly treated The bowel is restored to normal, and the patient suffers no permanent after effects The stools should be examined bacteriologically on several occasions to ensure that no *B dysenteriae* infection persists When it is found to do so Sulfasuxidine should be given in doses of 3 5 grammes 8 hourly to eradicate the infection

In cases where there has been extensive damage to the mucosa and submucosa and even to the muscular coats of the bowel during a very severe attack of bacillary dysentery, unmodified by treatment, repair takes place by the laying down of fibrous tissue This is covered by simple epithelium, and not by normal mucosa The scar tissue contracts, causing kinking and deformity of the bowel wall, trauma periodically leads to infection and breaking down of the scars, and a condition of chronic post dysenteric colitis results There is no specific treatment for this condition, which persists for life The sulphonamide drugs or penicillin may prove beneficial in controlling the exacerbations in some cases, but they are not consistently so If they do not produce a result within a week they should not be persisted with

after a cleansing enema of 2 per cent sodium bicarbonate solution In some cases

this treatment, repeated daily or on alternate days on a dozen occasions, appears to lead to rapid improvement in the condition of the inflamed and ulcerated bowel It at least has the virtue of being innocuous, this cannot always be said of the astringent enemas sometimes used The psychological effect of increasing ability to hold an enema is doubtless an important contributory factor in the improvement in the patient's condition

[illegible]

solutions The danger of stenosis of the bowel and necessity for a permanent opening must be appreciated Even with an efficient ileostomy the chronic ulcerative condition of the large bowel may persist indefinitely These operations as a rule are better avoided as they rarely achieve their object The physical inconvenience and mental disquiet inseparable from such short circuits usually more than counterbalance the dubious benefits they confer The operation of total colectomy, which is being increasingly performed, merits serious consideration in intractable cases of colitis

Fairley, N H, and Boyd, J S K (1943) *Trans R Soc Trop Med Hyg*, 36, 253
Marshall, E. K, Bratton, A C, Edwards, J B, and Walker, E (1941) *Bull Johns Hopk Hosp*, 68 101
Poth, E J (1943) *Texas J Med*, 39, 369
— Beach, M C, and Knotts, F L (1942) *J Lab clin Med*, 28, 162

LEISHMANIASES

DEFINITION

The leishmaniases are specific infections of man with protozoa of the genus *Leishmania* The organisms are conveyed by sand flies (*Phlebotomus* spp), in which they undergo biological development Three species of *Leishmania* parasitize man and though these are morphologically and culturally identical they show biological differences *Leishmania donovani* gives rise to a generalized visceral infection, causing the disease kala-azar, *L tropica* gives rise to a localized cutaneous infection, without systemic involvement, known as oriental sore, and *L braziliensis* brings about a condition known as espundia consisting of destructive muco-cutaneous lesions involving especially the oral and nasal apertures

KALA-AZAR

Kala azar occurs at the lower altitudes in the warmer moister regions of China, India, the Middle East, and the lands in and around the Mediterranean basin It is also found, under similar conditions, in the Sudan and Abyssinia Leishman- [illegible] the reticulo-endothelium [illegible]

granulocytopenia Kala azar is characterized by [illegible] sive wasting, and various pulmonary and abdominal complications, eventually it is fatal, usually within 2 or 3 years, unless specifically treated A diagnosis is estab-

lished on recovery of the organisms by blood culture during the fever, or by means [illegible]

[illegible] special media, in which they develop as flagellates

PROPHYLAXIS

There is no vaccine or drug treatment which will confer immunity against kala-azar, effective prophylaxis consists of the avoidance of bites by infected sand-flies [illegible]

[illegible] or destroyed, if found to do so

GENERAL TREATMENT

The disease in some respects resembles malaria, for which it is often at first mistaken A correct diagnosis is rarely established until the significance of the steady enlargement of the spleen and of the liver has been appreciated, and appropriate steps have been taken to find the parasites by biopsy In the average case at least 3 months elapse before the presence of kala-azar is detected Prostration is not a feature until the disease is well advanced Patients, during the pyrexial exacerbations, characteristically are free from the subjective manifestations accompanying fever to a similar degree of other causation

Those admitted for treatment should be confined to bed while specific treatment is being given There is no need for undue restriction of the diet or for any special nursing measures Where the sand-fly vectors occur steps should be taken, by suitable net screening, to prevent their access to the patient and so to limit the dissemination of the infection to others

SPECIFIC TREATMENT

Antimony

In 1913 V [illegible] while Rogers (1915) and Muir (1915) found it to be curative in Indian cases of kala-azar In 1916 Caronia discovered that sodium *para*-acetylaminophenylstibinate, or stibenyl, a considerably less irritant and less toxic pentavalent compound of antimony, was as therapeutically effective as antimony in the trivalent forms, and subsequently other compounds of this type were developed

The kala-azar of various areas differs in its response to antimony treatment, the Indian form of the disease is readily amenable, but the Sudanese form is very much more resistant to it Repeated unsuccessful treatment of the disease with antimony ultimately leads to the development of complete *resistance of the parasites*

to the metal Further treatment with antimony then fails to produce even temporary amelioration of the clinical condition

The administration of sodium antimony tartrate or of potassium antimony tartrate involves technical difficulties, and causes much discomfort to the patient As a result the pentavalent compounds of antimony have largely supplanted tartar emetic in the treatment of kala-azar where cost is not a primary consideration Nevertheless, tartar emetic is not inferior as a sterilizing agent to the newer compounds

Trivalent preparations—Sodium antimony tartrate is rather less toxic than the potassium salt, and is given intravenously, usually as a 2 per cent solution in physiological saline The initial dose for an adult is 2 millilitres, and this is increased by 1 millilitre at each subsequent injection until the full dose of 5 millilitres (0 1 gramme of the drug) is reached The injections are given thrice weekly, and their number is from 25 to 30 A course of treatment, therefore, is protracted The solution of tartar emetic must be introduced into a vein with the greatest care to ... tions there may be a ... ion in the chest, and ... attacks may occur

After each injection the patient must be kept prone for some hours Patients lose condition and weight during the course of treatment, but rapidly recover when it is completed

Pentavalent preparations—Neostibosan, diethylamine-*para*-aminophenylstibinate, is a yellow powder dispensed in ampoules It is readily soluble in water or in ...

... in solution in ampoules each containing 6 millilitres, each millilitre of the solution contains the equivalent of 0·1 gramme of antimony in the pentavalent form The drug is given intravenously, or, where this is impossible, intramuscularly The dose is 6 millilitres daily, and this is repeated for 12–14 injections as a maximum

Urea Stibamine, a mixture of urea and *para*-aminophenylstibinic acid, is dis- ... 0 2 gramme of the drug It is freely soluble in ... employed is not of ..., care must be taken ... n is irritant If given intramuscularly it causes considerable pain. The initial dose is 0 05 gramme, the second 0·1 gramme, the third 0 15 gramme, and subsequently 0·2 gramme is given on a dozen occasions The drug is injected on alternate days, or thrice weekly

Treatment with the pentavalent antimonials may cause temporary discomfort and, sometimes, vomiting at the time of the injections A condition resembling anaphylactic shock may attend their use, and this usually occurs within an hour after the fifth or sixth injection. The temperature rises sharply, there may be a

rigor, and in unusually severe reactions cyanosis and severe shock with on rare occasions, a fatal issue When this reaction does occur it should be treated by the injection of adrenaline, and it usually ends within a short time

The diamidines

In 1939 Adams and Yorke successfully treated an Indian case of kala azar with

treatment of a number of other protozoal infections of man and of animals They were soon shown to be effective in the treatment of kala azar from all geographical areas of the distribution of the disease, moreover, with them were cured Sudanese infections which had become completely refractory to antimony as a result of previous unsuccessful antimony treatment

Stilbamidine was found to be extremely toxic if not used immediately after being made up in solution, this toxicity was ultimately shown to be a result of exposure of

of kala azar, but again, its use was found to be attended by the development of neuropathies A third drug of the series, Pentamidine, 4 4 (-diamidinodiphenoxy-

Antistin or Anthisan

vel

of

salt is given by the mouth to forestall a fall in blood pressure The results of treatment are extremely good, and very few cases of kala azar require re-treatment after this course Pentamidine, accordingly, is the drug of choice in the treatment of kala-azar

The criterion of cure in kala azar is freedom from recrudescence of the clinical manifestations of the disease and the disappearance of parasites, as judged by biopsy and culture at 3 monthly intervals over a period of 1 year after the conclusion of treatment

CUTANEOUS LEISHMANIASIS

In cutaneous leishmaniasis the lesions are circumscribed indolent nodules which occur in the skin of exposed parts of the body They may be single but frequently are multiple *Leishmania tropica* may be found in endothelial cells forming the granulomatous tumours The larger nodules ulcerate, the ulcer is covered with a tough leathery crust, under this is a little viscid muco-pus heavily charged with secondary invading organisms this constitutes an oriental sore The condition is a self limiting one and usually terminates in about two years with much scarring.

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, but again, its use was found to be attended by the development preparation, neuropathies A third drug of the series, Pentamidine, 4 4 (-diamidinodip pentane), has been found to be as therapeutically effective as the preceding t its use is unattended by neurological sequelae Nevertheless, Pentamidine c temporary marked drop in the blood pressure following injection This blood pressure can be avoided by the use of one of the antihistamine drugs s Antistin or Anthisan

Pentamidine Isethionate, a freely soluble salt, is given intramuscularly, or venously, daily for from 12 to 15 days The daily dose is 2 milligrams per kilo of body-weight half an hour before each dose one tablet (100 milligrams) of A san is given by the mouth to forestall a fall in blood pressure The results of ment are extremely good, and very few cases of kala-azar require re treatment this course Pentamidine, accordingly, is the drug of choice in the treatment kala azar

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Cutaneous leishmaniasis occurs widely throughout the East, the Middle East, and around the Mediterranean basin It occurs in hot, arid areas, and its incidence, therefore, is not coincident with that of kala-azar.

Prophylaxis

The measures referred to in the present [illegible]
equally applicable [illegible]
face is particularly [illegible]
scarification with m[illegible]
severe one, but the immunity gained affords partial or complete protection against the subsequent development of sores on the face and, so, disfigurement

General Treatment

If the lesions are cleared of secondary bacterial invaders they tend to heal, and scarring is minimized Scraping, under anaesthesia, with a sharp spoon and swabbing with pure phenol, and subsequent strapping with Elastoplast for a week may cure the larger sores Alternatively, local applications of solid carbon dioxide, or diathermy, or x rays, or radium may be tried, any of these proves satisfactory in most cases When there is evidence of gross sepsis in the lesion it is wise to clear this with hot fomentations, followed by eusol or similar dressings, before embarking on these physical measures

Specific Treatment

Antimony given parenterally is not particularly effective in the eradication of cutaneous leishmanial infections, and this method of treatment is usually reserved for cases with multiple lesions Antimony, locally applied in the form of a 4 per cent tartar emetic ointment, has been advocated, this causes pain unless cocaine is incorporated in the ointment, and there is little evidence that it is any more satisfactory than antimony given parenterally Local infiltrations with emetine hydrochloride, with mepacrine dimethylsulphonate, or with berberine sulphate, have been variously advocated One or two millilitres of emetine hydrochloride, in 5 per cent solution, may be infiltrated into the lesion About 1 millilitre of a 2 per cent solution of berberine sulphate may similarly be used The berberine infiltration must be repeated on about half a dozen occasions, and it is claimed that it produces more satisfactory results than do emetine or mepacrine injections

MUCO CUTANEOUS LEISHMANIASIS

Espundia is almost entirely confined to Central America and to South America, where it is highly endemic in certain forest areas Destructive ulcerating granulomatous lesions, containing many *L brazihensis*, involve the muco cutaneous junctions particularly of the mouth and nose, the soft parts of which are extensively destroyed The disease is frequently fatal from the septic complications and anatomical deformities it occasions, unless specifically treated

Treatment

Antimony was first used in the treatment of this form of leishmaniasis and it is still regarded as specific Tartar emetic, or Fouadin, a trivalent organic preparation of antimony, is most commonly employed both are given intravenously A few

[illegible]

[illegible]

LEPROSY

DEFINITION

Leprosy, known since earliest civilization, is a chronic disease affecting in particular skin and nerve tissue It usually develops insidiously after long incubation, and is due to infection with *Mycobacterium leprae* Leprosy occurs in the temperate zones of the world, but is preponderantly a disease of the tropics There are probably [illegible]

transmitted congenitally

TYPES OF LEPROSY

Lepromatous

In particularly susceptible persons the organisms multiply freely around the [illegible]

[illegible]

very commonly involved in the leprous process Periodically there are acute febrile attacks associated with severe constitutional disturbance and the exacerbation of the existing, and the development of new, lesions Death ultimately results from intercurrent infection rather than from the disease itself.

Neural

In individuals more resistant to the infection the multiplication of the organisms is inhibited Bacilli are so scanty that they are difficult or impossible to find Areas of skin infection, if present, are limited in extent, they are sharply circumscribed and thickened, owing to a vigorous granulomatous reaction to the presence of the organisms Bacilli in the peripheral nerves lead to an equally vigorous and localized defensive tissue response Granuloma formation in nerve trunks causes damage to the component nerve fibrils, the resultant motor, sensory, and trophic changes constitute the classical "neural" type of the disease Neural cases are the benign cases of leprosy, and are not potentially infective to others They tend to be self-limiting and may proceed to spontaneous cure of the primary infection, but the secondary deformities persist and may progress

drug as habituation is established The sulphones are rapidly excreted in the urine but there is no tendency to the deposition of crystals in the urinary tract To promote retention of the drugs the fluid intake should be restricted to less than 2 litres daily The makers of Sulphetrone recommend that 10 grains of sodium bicarbonate be given with each gramme of the drug, the tablets of which are crushed and mixed with this Determination of the blood levels of the drug can be done by a simple technique and these levels should be checked frequently With Sulphetrone a blood concentration of from 7 5 to 10 milligrams per cent is desirable, but it must not be allowed to rise above 12·5 milligrams per cent If it does so the drug must be stopped and copious fluids must be given to promote its excretion

The sulphones may give rise to toxic complications of which gastro intestinal disturbances, haematuria, and the development of a severe haemolytic anaemia are the most important The risk of these may be minimized by beginning treatment with small doses, which are slowly increased as tolerance to the selected drug is established The blood picture should be examined weekly to detect the onset of anaemia Iron and liver preparations may with advantage be given to forestall this One death from agranulocytosis has been reported as a sequel of treatment with Diasone Sulphetrone may cause a blue discoloration of the skin due to a circulating dye formed from the drug in the body In addition, over vigorous drug treatment may precipitate a febrile reactive exacerbation (lepra fever) of the disease, with a systemic disturbance and an increase in the number and extent of the skin lesions Treatment should be temporarily suspended when this occurs

Complications

Lepra fever may be acute, subacute, or chronic It may be precipitated by a complicating infection, or by over-vigorous treatment of the disease These causes should be suitably corrected The patient must be confined to bed on a light diet, with copious fluids, a dose of calomel should be followed by a saline purge, and a salicylate and alkaline mixture should be given A bromide or some other sedative may be necessary to relieve pain and sleeplessness If the fever persists 20 milligrams of potassium antimonyltartrate is given intravenously on alternate days after the third injection the dose is doubled, and this larger dose is repeated on 6 occasions In less severe lepra reaction 5 millilitres of a 1 per cent solution of mercurochrome intravenously, every third day, may prove more effective than tartar emetic in stopping the reaction Two per cent fluorescein in 2 per cent sodium bicarbonate may be tried when mercurochrome fails Solganal B Oleosum or Myocrisin in doses of 10 milligrams intramuscularly, once a week for 3 weeks, followed by 50 milligrams weekly for another 3 weeks has been advocated in persisting lepra fever

NEURAL LEPROSY

Neural leprosy is associated with a vigorous local tissue reaction to the infection This reaction may be stimulated in the skin by painting macules with trichloracetic [illegible] of the acid

para-

cute

neuritis, with severe pain, may be relieved by injections of alcohol [illegible] nerve

sheath, by deep x-ray therapy, or by the injection of 10 minims of adrenaline in 30 minims of saline solution either subcutaneously or along the course of the nerve. Abscess formation in granulomatous tumours in a peripheral nerve is relieved by stripping the sheath of the nerve, or by incision of the sheath and stretching of the nerve

The lesions of the feet and hands due to damage to the peripheral nerve trunks are trophic, motor and sensory in type The trophic changes in the skin are evident in changes in its elasticity and texture Trophic rarefaction of bone is followed by absorption and shrinkage of the phalangeal, carpal and tarsal bones Trophic ulcers, extending to bone, form intractable perforating ulcers, these not uncommonly occur in the soles of the feet Drop-wrist or claw hand is a result of damage to the motor fibres of the median or ulnar nerves, drop-foot is due to peroneal nerve damage Anaesthesia of the extremities facilitates unconscious trauma Sepsis is likely to follow injury, with much destruction of tissue

Particular care is necessary to avoid injury to the hands and feet Pressure by boots, abrasion of the hands by sticks or crutches, and similar simple traumas

healing is surprisingly good Removal of sequestra, or amputation of digits or even of an extremity, may become necessary, but surgical intervention should not be undertaken lightly.

OCULAR COMPLICATIONS

Involvement of the eyes is a common complication of leprosy, which is a common cause of blindness In the lepromatous form of the disease infiltration of the various

oculi due to nerve involvement, bring in their train a variety of secondary eye lesions Actual leprotic infection of the eyes responds well to specific treatment of the lepromatous infection with the sulphone series of drugs The secondary results of this infection, and those consequent on neural changes, must be dealt with on general lines by an ophthalmic surgeon

Faget G H Pogge R C Johansen F A

MALARIA

PARASITOLOGY

One of the most prevalent diseases of man, malaria occurs widely throughout the tropics, the subtropics, and some parts of the temperate zones of the world. It results from infection with one or more of four protozoan parasites, *Plasmodium*

vivax, *P falciparum*, *P. malariae*, and *P. ovale*, which cause benign tertian, malignant subtertian, quartan, and ovale tertian malaria respectively The latter two are comparatively rare parasites The infections are conveyed by night feeding mosquitoes (*Anopheles* spp), in which they undergo a sexual cycle of multiplicative development resulting in infection of the salivary glands The disease is transmitted by the bites of female mosquitoes only, the males do not feed on blood In man, the parasites, after an exo-erythrocytic cycle, invade the red cells, in which they undergo an asexual cycle of multiplication. This erythrocytic cycle results primarily in the

These undergo development in the body before parasitization of the red cells occurs Nearly 20 years ago it was shown that in the case of certain allied malaria parasites of birds an exo-erythrocytic cycle of parasite development exists concurrently with the more readily demonstrable erythrocytic cycle It has long been

blood Shortt and his co-workers (1948) unequivocally demonstrated that an exo-erythrocytic cycle does indeed occur in man in the case of *P. vivax* infection before the blood is invaded, and in 1949 they showed that a similar exo-erythrocytic cycle also takes place in human infection with *P falciparum* before the well-known red-cell forms appear in the blood, existence of an exo-erythrocytic cycle in conjunction with the erythrocytic cycle may in due course be established The occurrence of such a cycle has already been demonstrated in the mammalian

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rupture of the containing red cells liberates into the plasma young forms of the parasite and particulate malaria pigment The young parasites invade fresh red cells The pigment, haematin, is phagocytosed by endothelial cells, it accumulates in considerable amount in the organs containing many of these cells, such as the spleen, the liver and the bone marrow These organs enlarge as a result of engorgement and proliferation of the reticulo-endothelial and haematopoietic elements The red cell destruction leads to anaemia and to an increase in bile pigment formation The metabolites of the parasites cause toxaemia

of the blood parasites is associated with
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n fever the paroxysms

recur at 48-hour intervals, and in quartan fever at 72-hour intervals *Quotidian* fever is due to a double cycle of tertian fever, one cycle occurring a day behind the other Mixed infection with two or more parasites may give rise to a temperature chart which shows the superimposition of the infections, but in double infections one usually becomes dominant and the other subsides

In malignant subtertian malaria infections the erythrocytic parasites sporulate

in about 36 hours and they usually show no synchronous periodicity As a result there may be irregular, intermittent, or continuous fever; but the clear-cut classical malaria paroxysms are lacking Malignant subtertian parasite infected red cells tend to adhere to one another and to the walls of capillaries and small vessels Accumulations of parasitized red cells may obstruct these vessels in various organs of the body, and may give rise to acute pernicious manifestations of the most diverse kind When vessels in the brain are involved cerebral malaria results This is a rapidly fatal complication in the absence of prompt specific treatment. Severe toxaemia, profound anaemia, or hyperpyrexia may be seen in this infection, which owes its name to the high mortality associated with it

A diagnosis of malaria rests on the identification of the causative organisms Blood films should always be made before specific treatment is given A clinical diagnosis is inadequate, and in the case of malignant tertian malaria it may be grossly misleading

TREATMENT

Prophylactic

The prevention of infection in a community basically depends on protection from the bites of infected mosquitoes The proper siting of dwellings, gauze screening against the entry of insects, and the employment of insect repellents (such as dimethylphthalate) and of insecticides (for example, D D T) are measures to this end An attack on mosquito breeding places by spraying with oil and insecticides, and by engineering activities adapted to the species of mosquito prevalent, will help to break the normal man mosquito-man chain of transmission of the malaria parasites Drug treatment of the infected persons in an area, to prevent their infecting mosquitoes, is feasible under some circumstances

In addition to such steps towards the protection of the community, personal precautions against infection are also necessary These are of two types, mechanical and drug prophylaxis There must not be any avoidable exposure to the bites of [illegible]

the bed at night

Drug prophylaxis takes the form of regular dosage, throughout the period of exposure to infection and for some months afterwards, with one of the antimalarial drugs No drug at present available is a causal prophylactic against all the malaria parasites Proguanil will prevent infection with malignant subtertian malaria, but it does not afford protection against the acquirement of the other parasites Continued drug prophylaxis controls an infection, and so prevents overt clinical manifestation of its presence If drug prophylaxis is continued for an adequate period the infection will die out without the patient being aware of its presence If the drug is stopped before the disappearance of the infection, or if it is taken in inadequate or irregular dosage, clinical malaria occurs This was abundantly evident in the number of infections in troops returned from overseas, which revealed themselves for the first time after stopping regular drug prophylaxis

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destruction leads to anaemia and to an increase in bile pigment formation The metabolites of the parasites cause toxaemia

The periodic synchronous sporulation of the blood parasites is associated with febrile paroxysms, which are characteristic of all the human malaria infections with the exception of the malignant subtertian disease In tertian fever the paroxysms recur at 48-hour intervals, and in quartan fever at 72-hour intervals Quotidian fever is due to a double cycle of tertian fever, one cycle occurring a day behind the other Mixed infection with two or more parasites may give rise to a temperature chart which shows the superimposition of the infections, but in double infections one usually becomes dominant and the other subsides

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the bed at night

Drug prophylaxis takes the form of regular dosage, throughout the period of exposure to infection and for some months afterwards, with one of the anti-

parasites Continued drug prophylaxis controls an infection, and so prevents overt clinical manifestation of its presence If drug prophylaxis is continued for an adequate period the infection will die out without the patient being aware of

·35 gramme)

The last two

compounds are more effective than is quinine in clinical suppression, and, of the two, proguanil has the advantage that it is colourless, tasteless and non-toxic. Whichever is selected must be taken with unfailing regularity to fulfil its purpose.

GENERAL

[illegible]

the patient comfortable. He is encouraged to drink copiously. If hyperpyrexia develops this must be controlled mechanically. Evaporation of water from the surface of the body by a fan is the most effective way to achieve this The cooling [illegible]

[illegible]

this infec [illegible] improve [illegible] a liberal [illegible] shrunk to its normal size, in view of the possibility of rupture of the organ, but convalescence is not protracted, and the physical signs and the disability following malaria soon vanish when the disease is adequately treated.

CHEMOTHERAPY

Fundamental research on the treatment of malaria was largely impracticable while experiments on man alone were possible. The development by Roehl (1926) of a technique utilizing canaries infected with *P. relictum*, an avian malaria parasite, for the testing of chemotherapeutic remedies was a great advance. German workers, using Roehl's technique, empirically examined by-products of the dye industry for [illegible]

[illegible] mepacrine has provided an effective practical [illegible] exerts [illegible] th the latter compound.

There was further intensive study on the chemotherapy of the malaria infections owing to the impetus given by the outbreak of World War II. The malaria problem in relation to troops was greatly intensified by the sequestration of the world's [illegible] the war [illegible]

that compounds belonging to 4 or 5 chemical groups showed promise of an activity akin to that of the accepted drugs The field was eventually narrowed to a few preparations, among these being chloroquine (S N 7618) (Aralen), oxychloroquine (S N 8137) and camoquin (S N. 10751) (Cam-aqi), all 4-aminoquinolines, and pentaquine (S N 13276) and *iso*-pentaquine (S N 13274), both 8-aminoquinolines resembling pamaquin, regarded as worthy of more extensive trial against the human infections These compounds are at present being examined, but sufficient data are not available for a balanced appraisement of their place in the ranks of the antimalarial drugs.

The British workers, Curd, Davey and Rose (1945), attacked the problem in another manner The sulphonamides were known to exert some action on the malaria parasites of man This action is inhibited by *para*-aminobenzoic acid, thus indicating a similarity between the mechanisms of antibacterial and of antimalarial action Pyrimidine compounds are important components of the normal cell It was thought that analogous substances might act as antimalarials by interference with the pyrimidine component of the parasite cell so compounds with a

against the malarias of man, in whom it has proved both therapeutically active and singularly free from toxicity It is efficient in the arrest and the suppression of *P vivax* and *P falciparum* infections in a remarkably wide range of dosage. Further, in adequate dosage, it is a causal prophylactic against malignant subtertian malaria infection, and it will usually sterilize this infection when established Unfortunately, it has not supplied a satisfactory solution to the problem of relapsing benign tertian malaria, probably because it does not destroy the exo-erythrocytic stage of this parasite.

Specific

In clinical practice the treatment of an acute attack of malaria is the same, whatever the species of causative parasite. The aim is to destroy the erythrocytic forms of development and so to bring to an end the acute manifestations of malaria, no drug so far available will destroy with certainty the exo-erythrocytic forms of any

biguanide

Quinine

Cinchona bark was introduced into Europe from South America in 1632 as a

also effective antimalarials, a fact emphasized by the considerable and [illegible]

[illegible] drugs is rapidly to destroy the circulating asexual erythrocytic parasites responsible for the acute clinical manifestations of the disease They do not *sterilize the naturally* acquired infection in more than a very small number of cases, whatever the species of parasite involved and in whatever dosage they may be given

Quinine sulphate is a cheap and readily obtainable salt of the drug but is relatively insoluble in water although it is soluble in acid solution The effective dose for the treatment of acute malaria is 30 grains (2 grammes) daily, and this is divided into 3 doses administered 8 hourly for 3 or 4 days It may be given by the mouth in the following mixture

Quinine sulphate	10 gr	0 65 g
Dilute sulphuric acid	20 min	1 25 ml
Syrup of orange	30 min	2 0 ml
Chloroform water, to	½ fl oz	15 0 ml

If retained and absorbed, this dose, given 8 hourly for 4 days, will rapidly arrest a clinical attack of malaria The blood will be cleared of asexual forms of the parasite, but parasitic and clinical relapse will follow in due course in the absence of further treatment

The hydrochloride is soluble to 1 30 in water, and the bisulphate to 1 12 the bihydrochloride is very readily soluble in water (1 1) These are more expensive than is the sulphate, they may be used in solution or in tablets for oral administration The dosage in each case is the same as that of the sulphate It is essential that tablets liberate their contents in the gut, this they sometimes fail to do, and their main virtues are portability and convenience in use

When a patient is vomiting or is unable to swallow or to retain drugs by the mouth it is necessary to resort to parenteral injection In such cases 10 grains [illegible]

usually is possible to resort to oral dosage Alternatively, 10 grains (0 65 gramme) of quinine bihydrochloride in 3 or 4 millilitres of sterile water may be injected deep into the body of one of the gluteal muscles The injection of quinine causes local necrosis, this may result in the formation of a fixation abscess For this reason intramuscular injections of quinine are held to be unjustifiable by some authorities Quinine is rapidly absorbed when given by the mouth and it should not be injected if this can be avoided

Patients with malignant subtertian malaria who show signs of cerebral irritation or of coma, an indication of the onset of cerebral malaria, must be given 10 grains (0 65 gramme) of quinine bihydrochloride intravenously at once In such cases fluid should be given intravenously in the form of glucose saline solution and the quinine may be incorporated in 500 millilitres of this The injections of quinine bihydrochloride are repeated at 8 hour intervals until the patient has sufficiently recovered to take the dose by the mouth A continuous isotonic glucose saline drip should be installed until the patient is sufficiently recovered to drink freely, and the quinine may be introduced into this at the appropriate times

There is no evidence of the existence of quinine-resistant strains of malaria parasites, although some strains respond to rather smaller doses of quinine than do others The therapeutic dosage of quinine advocated will rapidly arrest any acute attack of malaria, whatever the species of parasite concerned, unless the patient is moribund

Quinine salts are bitter in taste and unpalatable In therapeutic dosage they cause tinnitus and deafness in the unhabituated Some rare individuals show idiosyncrasy to quinine, and the toxic effects take the form of urticaria, localized oedema and

Mepacrine

Mepacrine is a 9 aminoacridine and the standard tablet contains 0 1 gramme of the drug in the form of the hydrochloride These tablets are bright yellow in colour and taken over a period the dye stains the skin This must not be confused with jaundice, the conjunctivae are rarely stained, and the urine is not laden with bile

When parenteral injection is necessary, mepacrine dimethanesulphonate, a readily soluble salt, may be given intramuscularly or intravenously in doses of 0 125 gramme It has already been stated that parenteral medication is necessary only when a patient is so ill that he cannot swallow and retain drugs, and that quinine is the most rapidly effective of the antimalarial drugs In such cases, where the need for treatment is urgent and a quick result is imperative, quinine is the drug of choice, only exceptionally should parenteral mepacrine preparations be resorted to

Mepacrine when first taken, may cause nausea and abdominal discomfort with diarrhoea These vanish with habituation to the drug Very rarely more severe toxic reactions are encountered which involve the skin, the central nervous system or the eyes The skin reactions commonly take the form of lichenoid eruptions, or of an eczematoid dermatitis central nervous system intoxication is manifest in toxic psychoses, and the eye lesions are seen only in those who, in handling the powder get it into the eyes as an industrial hazard These toxic reactions are an indication for withdrawal of the drug

Proguanil

SUPPRESSIVE

infection, relapses have been recorded for 20 or 30 years Malignant subtertian malaria, on the other hand does not recur over these lengthy periods It ceases to relapse within, at most, 12 months from the last exposure to infection After the arrest of an attack of malaria by specific treatment, steps should be taken to fore stall relapse Drugs are given to this end in the form of suppressive or prophy

and the patient can continue his normal activities while taking them

The drug employed in suppressive treatment need not necessarily be that used to arrest the clinical relapse Quinine, for example may have been used to this end, but proguanil and mepacrine are more efficient suppressives than is quinine, and one of these is preferable for this purpose

Quinine

The sulphate in solution, or tablets of the hydrochloride, bisulphate or bihydro-

appeared, but a large proportion (about 70 per cent) of the benign tertian and quartan infections will relapse within a few days or weeks, or on occasions after several months When this occurs the relapse is treated, after microscopical confirmation of the diagnosis, as previously indicated, and another 3 month course of suppressive treatment follows These procedures, in a non endemic area, are repeated as necessary until the infection eventually vanishes

It is held by some authorities (Stephens and his co workers, 1919) that a suppressive course of quinine is more effective if the drug is given in bigger doses on 2 consecutive days each week, rather than daily Quinine sulphate in acid solution in doses of 10 grains (0 65 gramme) can be prescribed 8 hourly, on each Saturday and Sunday only, for 3 months In the event of subsequent relapse the procedure is repeated, after arrest of the relapse by full therapeutic dosage

Mepacrine

One tablet (0 1 gramme) daily for 3 or 6 months is the dosage advocated for a suppressive course of mepacrine in a non endemic area This is even more effective than quinine in suppressing fever, and it is very exceptional for minor relapses to occur while the course is in progress Relapse, after treatment of the acute condition, is followed by repetition of the suppressive course

Proguanil

The suppressive dosage of 0 1 gramme twice weekly, originally advocated, has failed to control some malaria infections One tablet (0 1 gramme) daily should

Proguanil treatment may be reinforced by giving quinine or mepacrine during the first three days, so obtaining a quicker response

A soluble salt, proguanil lactate, has been prepared for parenteral inj the observations on the parenteral use of mepacrine equally apply here. the drug of choice where rapidity of action is demanded

Proguanil in therapeutic dosage by the mouth causes no marked to effects and even when given in several times the advocated dosage it has singularly free from toxicity

Chloroquine

Chloroquine is a 4 aminoquinoline with a therapeutic action similar to th mepacrine to which it is claimed to be superior therapeutically and by reason lower toxicity The advocated dosage is 1 5 grammes by mouth on the first d and then 0 5 grammes on each of another two days This will arrest acute atta of malaria and is said to sterilize a high proportion of malignant subterti infections

Camoquin

Camoquin is another 4-aminoquinoline which resembles other drugs of this series in action It has not been as widely used as chloroquine, but is stated to give similar results in doses up to 400 milligrams thrice daily for 5 days

Pamaquin

Pamaquin is an 8 aminoquinoline derivative dispensed in tablets each containing 0 01 gramme of the hydrochloride The dose is 1 tablet 8 hourly for 5 days, or at most for a week In safe dosage it exerts little action on the asexual forms of the parasites responsible for the clinical manifestations of infection It does, however specifically destroy the gametocytes, especially those of malignant subtertian malaria, and it also has some action on the exo-erythrocytic forms when given in this dosage Pamaquin treatment therefore renders the patient non infective to the insect vector, and it may ensure sterilization if given with a drug which destroys the erythrocytic forms

It has been stated that if treatment of an acute clinical attack of benign tertian malaria for a week with quinine is concurrent with, or immediately followed by a course of pamaquin, fewer patients subsequently suffer relapses This is doubtless due to the action of pamaquin on the exo-erythrocytic forms of the parasite which are unaffected by quinine and which if not destroyed, originate further erythro-cytic forms so causing a clinical relapse

Pamaquin is toxic and may cause methaemoglobinaemia, cyanosis and acute bdominal colic Patients taking the drug must be kept under close observation, and must be stopped at onco if toxic manifestations appear

ntaquine and iso pentaquine

These compounds are 8 aminoquinolines resembling pamaquin in their action on etocytes and on the exo-erythrocytic forms of the malaria parasites If given urrently with, or immediately after, a course of quinine, a higher proportion of n tertian (*P vivax*) malaria infections is sterilized, but they have little effect on ythrocytic parasites and are ineffective in controlling the clinical attack The ated dosage of pentaquine is 60 milligrams by mouth daily for 10 d

SUPPRESSIVE

malaria, on the other hand, does not recur over these lengthy periods It ceases to relapse within, at most, 12 months from the last exposure to infection After the arrest of an attack of malaria by specific treatment, steps should be taken to fore-

The drug employed in suppressive treatment need not necessarily be that used to arrest the clinical relapse Quinine, for example, may have been used to this end, but proguanil and mepacrine are more efficient suppressives than is quinine, and one of these is preferable for this purpose

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prove a satisfactory suppressive for any of the malaria infections, with the ex
tion of some rare strains of malignant subtertian malaria The course, in a r
endemic area, should be continued for 6 months Proguanil is the most popula
the antimalarials in suppressive treatment, in view of its efficiency and of the co
plete absence of side-effects attending its use

Chloroquine

A daily dosage of from 50 to 100 milligrams has been advocated, but a singl
dose of 0 5 gramme weekly is effective, as this drug is very slowly excreted

CHILDREN

Children tolerate quinine well, but the taste of the salts usually employed may lead to difficulty in their administration Quinine ethylcarbonate is less bitter in taste than the other salts, and so may be easier to administer For infants under 1 year old 1/10 of the adult dose is given, for children between 2 and 10 years from 1/8 to 1/4 of the adult dose is usual Mepacrine is also well tolerated by children, and the dosage may be adjusted as for quinine The same applies to proguanil

PREGNANCY

Very great numbers of parasites accumulate in the sinuses in the placenta, but maternal infection of the infant is extremely rare The fever resultant on uncontrolled malaria is a common cause of abortion Quinine will control the malaria and will not of itself cause abortion In view of the popular belief, however, that it does so, mepacrine or proguanil may be used in preference to quinine in the treatment of pregnant women

Malaria is prone to relapse after parturition It is therefore advisable to continue suppressive treatment of a malaria infection in a pregnant woman, whenever discovered, throughout the pregnancy and for some months thereafter Proguanil is
he best drug for this purpose

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MELIOIDOSIS

idosis is a rare glanders like disease due to infection with *Pfeifferella whit-*
an organism normally enzootic in rats, and to a lesser extent in other animals,
which it is acquired sporadically by man It occurs chiefly in Malaya, Burma,
and the East, odd cases have been reported in the temperate zones Infec-
man usually results in the development of multiple caseous abscesses in
organs and tissues, the symptoms are those of a septicaemia with severe
ry involvement, the mortality is very high, most patients dying within a
s of the onset except in those cases with isolated and accessible abscesses
osis is established on recovery of the organism

TREATMENT

Successful treatment with an autogenous vaccine of a mild case of melioidosis has been reported by Peck and Zwanenburg (1946), but the single skin lesion in their case appeared to have been resolving before treatment was begun Mirick and his colleagues (1946), and others, have found *Pf. whitmori* to be susceptible to sulphadiazine *in vitro*, but treatment of cases of the disease with this drug has not proved effective The organism is insusceptible to penicillin *in vitro* A strain of it recovered from a human case of melioidosis by McDowell and Varney (1947) was at first found to be very susceptible *in vitro* to streptomycin, though it rapidly became insensitive to it McDowell and Varney treated the patient with a variety of

infected with this organism survived after streptomycin treatment, but Gutner and Fisher (1948) found a strain of *Pf whitmori*, isolated from a human case of melioi-

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PLAGUE

INTRODUCTION

Plague is an acute toxaemic disease which is due to infection with *Pasteurella pestis* It assumes various clinical forms which largely are dependent on the method of infection and its virulence The bubonic and septicaemic forms of plague are acquired by man from infected rodents through the agency of certain rodent fleas,

AETIOLOGY

Probably originating in the Central Asiatic plateau, plague has spread in a series of pandemics at one time or another to most parts of the world At present it is

grammes are given 4 hourly that of sulphadiazine is initially 4 grammes, followed by 2 grammes 4-hourly The selected drug should be continued until the pulse rate and the temperature have remained normal for 2 days, the treatment should not be continued for more than 10 days

Antibiotics

In 1945 Withn and Wilbar showed penicillin to be ineffective against experimental plague infections in guinea pigs others have confirmed the absence of any effective action by this compound against plague infections In 1946 Wayson and McMahon *showed that streptomycin, given subcutaneously, in experimental plague infections* in mice reduced the mortality rate in a manner comparable to that of sulphadiazine or sulphapyridine Hornibrook (1946) found streptomycin to be more active against experimental plague infections in mice than is sulphadiazine Herbert (1947) showed that streptomycin, in concentrations of 3 units per millilitre, rapidly sterilizes cultures of plague bacilli, a 3½-day course of treatment with streptomycin (1,600 units per day), starting at 0, 24, and 48 hours after infection, cured 90 per cent, 95 per cent, and 35 per cent respectively, of mice subcutaneously infected with a highly virulent strain of *Past pestis* A 3½-day course of treatment (40,000 *units per kilogram per day)* invariably prevented death among guinea pigs similarly infected, even when treatment was delayed for 48 hours after infection In compar able tests streptomycin proved to be considerably more effective therapeutically in mice than did sulphathiazole

Wagle (1948) of the Haffkine Institute Bombay, consists of an initial intramuscular

(1939) E Afr med J 14 362
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SPRUE

INTRODUCTION

ment of a severe anaemia of the hyperchromic macrocytic type The onset may be delayed for years, the course is chronic and is associated with periodic exacerbations, and the disease is ultimately fatal in the absence of adequate treatment

The stools from a patient with active sprue are pale, bulky and gaseous, they contain up to 70 per cent of fat, estimated as a weight proportion of the dried faeces, the ratio of split to unsplit fat is approximately normal Gaseous distension of the intestine is due to fermentation of unabsorbed carbohydrates this gas formation increases the dyspeptic symptoms associated with the condition The failure to absorb adequate amounts of the necessary fundamental foodstuffs leads to wasting, and the severe anaemia contributes to the mental and physical debilitation from which a patient with sprue suffers

Tropical sprue in many respects closely resembles idiopathic steatorrhoea and coeliac disease of the temperate climates, but it is much more readily amenable to treatment than is either of those two conditions

TREATMENT

General

The treatment of a patient with sprue involves confinement to bed for some weeks,

only if he will enter hospital and is prepared to remain there as long as may prove necessary His full confidence and willing co-operation throughout are essential if a satisfactory result is to be obtained The closest supervision is necessary to ensure that there is no departure, knowingly or unwittingly, from the dietary scale pre scribed Unexplained setbacks in progress can be traced almost invariably to this source A slow and steady progression in treatment, each step being made good before the next is taken, is all important, and pressure from the patient or his friends to try to expedite the procedure must be resisted firmly Concomitant disease or infections must be dealt with

Dietary

The first step in the treatment of sprue is modification of the diet The importance

sisted of cows' milk, in the early stages it was diluted and given in small quantities

at frequent intervals The fat in cows' milk, being finely divided and of low melting

taken, and additional articles of diet were then gradually introduced The fruits used in the fruit dietary were bael fruit, plantains, strawberries or other suitable

sugar

With advancing knowledge of normal nutritional requirements, and a better understanding of the causation and the treatment of macrocytic anaemias, the dietary and medicinal treatment of sprue has been further elaborated For milk can be substituted a dried milk powder, such as Sprulac, which contains protein, fat, and carbohydrate in the ratio of 1 0 0 3 1 3, each ounce of Sprulac yields 125 calories The importance of vitamins has been appreciated, and these are supplied in various forms Specific treatment for the anaemia takes the form of the injection of crude liver extracts parenterally, or their administration by the mouth, and in advanced cases with a red-cell count below 2,000 000 transfusions of packed red cells, repeated if necessary, may be advisable Iron, in the form of ferrous sulphate, is given by the mouth

Systematized graded diets of high protein and low fat and carbohydrate content have been introduced There are several such dietaries and the following one, which was elaborated by Fairley in 1931, gives good results

High Protein Meat Diet

Diet No 1 (*Calorie value = 770*)

8 a m—Underdone beef 3 oz , rusks, ¾ oz , juice of ½ orange and glucose, 8 grammes
12 noon—Soup, 4 oz. + liver extract (= ⅛ lb), underdone beef, 3 oz , rusks ¾ oz , juice of ½ orange and glucose, 4 grammes
6 p m—The same as at *12 noon*
Protein fat carbohydrate = 1 0 0 3 1 2
Note—When patients are very ill, 2 hourly feeds of meat and beef juice can be substituted

Diet No 2 (Calorie value = 1,280)

8 a m—Underdone beef, 5 oz , rusks, 1 oz , calves foot jelly, 2 oz , juice of 1 orange + glucose, 8 grammes
12 noon—Soup 4 oz + liver extract (= ⅛ lb), underdone beef, 5 oz , rusks, 1 oz , juice of 1 orange + glucose, 4 grammes
4 p m—Tea, 10 oz , milk, 2 oz
7 p m—The same as at 12 noon + calves-foot jelly, 2 oz
Protein fat carbohydrate = 1 0 0 3 1 0

Diet No 3 (Calorie value = 1,820)

6 a m —Tea, 10 oz; milk, 2 oz
8 a m —Underdone beef, 6 oz , rusks, 1½ oz , calves foot jelly, 2 oz , juice of 1 orange + glucose, 8 grammes
10 a m —1 baked apple, custard, 1 oz
12 noon —Soup, 4 oz + liver extract (= ¼ lb), underdone beef, 6 oz , calves foot jelly, 2 oz., rusks, 1½ oz , juice of 1 orange + glucose, 8 grammes
4 p m —Tea, 10 oz , milk, 2 oz , baked apple 1 oz., custard, 1 oz.
7 p m —The same as at 12 noon
Protein fat carbohydrate = 1 0 0 32 1 3

Diet No 4 (Calorie value = 2, 200)

a.m —Tea 10 oz , milk, 2 oz
8 a m —Underdone beef, 7 oz , rusks 1½ oz., calves foot jelly 2 oz , juice of 1 orange + glucose, 8 grammes
10 a m —1 baked apple + custard 2 oz
12 … 7 oz , calves foot jelly,

4
7
Protein fat carbohydrate = 1 0 0 34 1 3

Diet No 5 (Calorie value = 3,020)

glucose, ½ oz honey, 8 grammes, butter, 4 grammes
10 a m —1 baked apple, custard 3 oz
… jelly,
… oz.,

Protein fat carbohydrate = 1 0 0 36 2 0

Water may be taken freely between feeds No condiments other than salt are permitted Constipation if it occurs may be relieved by liquid paraffin No advance from one stage to the next in the diet should be contemplated until the patient has remained on it for at least a week, during which time the stools should have remained normal in colour and consistency

In the event of a recurrence of flatulence, of steatorrhoea, or of other evidence of reactivation of the disease, a searching inquiry into the diet must be made at once …

least two stages in the scale It is better to reduce the diet considerably more than is absolutely necessary, than to attempt to compromise and reduce it insufficiently

MEDICINAL

Med cinal treatment beg ns th

die

6 p

ext

first few days and regularly thereafter Both folic acid and vitamin B_{12} have recently been advocated in the treatment of sprue In most cases they cause a speedy return of the blood picture to normal

been disappointing Doses of

orally or parenterally without

doses have yet to be determ ned

dietary treatment must not be neglected after a dramatic response to folic acid or the condition will probably relapse

The sore mouth and tongue of sprue may be relieved by the following alkaline mouth rinse

Sodium bicarbonate	20 gr	1 2 g
Glycerin	60 min	4 ml
Tincture of myrrh	20 min	1 2 ml
Water to	1 fl oz.	30 ml

Nicotinic acid (150-300 milligrams) and riboflavine (3 milligrams) daily for 2 or 3

calcium deficiency of sprue

During World War II there were many cases among young troops in India presenting the classical early symptoms and signs of sprue Some of these failed to respond to treatment until treated with the sulphonamides when the diarrhoea promptly ceased It would seem that a bacillary infection primarily caused the diarrhoea and that this under the stress of climate and Service conditions led to the development of a sprue syndrome which continued until the bacillary infection was controlled On being treated with sulphaguanidine and with dietary and other suitable treatment most of these patients rapidly recovered from the sprue state and showed little tendency to further relapse

AFTER TREATMENT

months When it is certain that there are no signs of recrudescence a further gradual

increase in the dietary is permissible, but at least 12 months should be allowed to elapse before attempting a return to a normal routine of life and food If there is then evidence of relapse the patient should immediately curtail his activities and sharply restrict his diet until such evidence has vanished. If it does not do so he should seek further advice without delay It is inadvisable for persons who have had sprue to return to the tropics, if this can be avoided, for at least 2 years after the last sign of activity of the disease

TRYPANOSOMIASES

DEFINITION

AFRICAN SLEEPING SICKNESS

Sleeping sickness or Negro lethargy is conveyed by the bites of infected tsetse flies, and it is one of the major problems in a large area of tropical Africa For a

stage of African trypanosomiasis there are irregular fever, tachycardia, lymphatic

human disease

TREATMENT

Prophylactic

The prevention of infection basically lies in the avoidance of the bites of infected tsetse The flies bite only during the daylight hours, so journeys through limited fly-belts can safely be made at night In the daytime they require shade, and will not travel far from it, so bush clearance for some 50 yards along the sides

of roads, at watering places, and around dwellings and villages, will minimize the risk of attack by tsetse

time in those at risk of infection in an endemic area

GENERAL

In view of the gravity of African trypanosomiasis, thorough and efficient treatment should be given as early as possible The prognosis in the earlier stages is extremely good, it becomes progressively worse as the disease advances In the late secondary stage, though the infection may be successfully eradicated, irreparable damage may have taken place and a return to complete normality cannot be expected

CHEMOTHERAPY

In 1902 Dutton first discovered a trypanosomal infection in man, and it was established that this infection was the cause of African Negro lethargy In 1905 Thomas recorded his discovery, fundamental in chemotherapy, that laboratory animals could be cured of various experimental trypanosomal infections by the injection of Atoxyl sodium *para* aminophenylarsonate a comparatively non toxic form of arsenic This important observation, it is worthy of note, led to an immediate visit by Ehrlich to the Runcorn Research Laboratories of the Liverpool School of Tropical Medicine, where Thomas was working On his return to Germany Ehrlich immediately re-examined a number of arsenical compounds for therapeutic activity *Within a brief space of time he found "606", Salvarsan to* be therapeutically effective against the causative organism of syphilis, and the treatment of this disease and of the other spirochaetoses was revolutionized After the *initial work of Thomas many pati*
were successfully treated with Atox
orsanine, a monosodium salt of
Although these proved therapeutically effective in early cases, in particular of *T gambiense* sleeping sickness, it soon became clear that they were not curative in the late stages of the disease when a parasitic meningo-encephalitis had developed

Within the last few years Melarsen oxide (*para* melaminylphenyl ...) a trivalent derivative of the more toxic pentavalent arsenical Melarsen, (sodium *para melaminylphenylarsonate*) (Friedheim, 1941) has been stated to be as effec-
... the treatment both of
... be devoid

In 1920 suramin, or Antrypol, a complex urea substitution derivative containing no heavy metal, was introduced by Mayer and Zeiss as a therapeutic remedy for

proved remarkably effective in the treatment of early stage cases of human trypanosomiasis, and also against certain other protozoal infections both of man and of animals The diamidines, however, suffer the defect of most remedies for sleeping sickness in that they do not penetrate into the central nervous system, and so they are of little value in advanced cases of the disease

that
a
in-
f
tage
T rhodesiense sleeping sickness, when arsenicals are the only drugs which may be effective, is therefore correspondingly bad Furthermore, in the case of both *T gambiense* and of *T rhodesiense* infections, repeated subcurative or ineffectual treatment with arsenic renders the parasites progressively more refractory to arsenic, until a stage of complete arsenic resistance is ultimately reached This resistance to arsenic, however, is not associated with increased resistance to suramin or to the diamidines, and, moreover, there is no evidence that resistance to these drugs can be engendered by any means Thus suramin or the diamidines are usually employed for the treatment of early stage cases of African sleeping sickness, in which they are very effective, and arsenic, in the form of tryparsamide or Melarsen oxide, is reserved for the treatment of late-stage cases of the disease with central nervous system involvement

SPECIFIC

In the very earliest stage of infection trypanosomes can be found in tissue juice aspirated from the chancre developing at the site of the infecting tsetse bite Within a week or two they are to be found in the blood plasma, or they can be recovered by aspiration of one of the enlarged lymph glands to be found in the posterior triangle of the neck At this time the infection is readily sterilized by the administration of suramin or of Pentamidine In the case of *T gambiense* infections, but not of *T rhodesiense* infections, certain arsenicals in the pentavalent form are also therapeutically effective in this stage

Suramin

Suramin is readily soluble in water, and is given intravenously as a 10 per cent solution The dose for an adult is 1 0 gramme, and this is repeated twice weekly, or every 3 days, until a total of 10 grammes has been administered One or two injections of 1 0 gramme on occasion have proved curative, and a course of 10 injections will with certainty cure early-stage cases of African sleeping sickness,

albuminuria increases red cells and granular casts appear in the urine and anuria and uraemia may follow

Pentamidine

One of the diamidines Pentamidine is used in the freely soluble form of Pentamidine Isethionate It is given in solution usually intramuscularly after an initial dose of 100 milligrams 200 milligrams are given daily for 10 days It is an extremely effective therapeutic remedy in first stage *T gambiense* or *T rhodesiense* sleeping sickness but is not effective after central nervous system involvement has taken place

Pentamidine injections cause a sudden marked but temporary fall in the blood pressure This may be obviated by giving 1 tablet (100 milligrams) of one of the antihistamine drugs such as Anthisan by the mouth half an hour before each injection

Tryparsamide

When lumbar puncture of a case of African sleeping sickness shows an increased

the infection is sterilized until the cerebrospinal fluid has returned to normal and *remained so for at least 6 months after treatment*

Tryparsamide may cause optic atrophy and narrowing of the fields of vision is an indication of the onset of visual complications Exfoliative dermatitis is a less *common toxic complication following its use*

Melarsen oxide

The drug has been used in the form of a 5 per cent solution in propylene glycol One course of treatment advocated consists of two series of seven daily intravenous injections each injection containing 1 5 milligrams of the drug per kilogram of body weight An interval of one month elapses between the courses which give rise to no toxic effects

Synergic treatment

used in the mass treatment of *infected populations (McLetchie 1948)* ... the simultaneous injection of 0 5 gramme of suramin and 1 5 grammes of tryparsamide the injections are repeated at 5 day intervals on 6 or 8 occasions in early cases and *20 injections are given in advanced cases of the disease* Another synergic course takes the form of an initial dose of 0 2 gramme of suramin followed by 3 injections of that drug each of 1 0 gramme at 5 day intervals 1 0 gramme of

tryparsamide is then given and repeated at 5-day intervals for 10 injections In either of these courses Pentamidine may be substituted for suramin

In addition to the possible reinforcement of action of the drugs, such combined courses of treatment possess the merit of suitability for cases at any stage of the disease, thus obviating some of the difficulties of detailed laboratory examination attendant on the examination of large numbers of persons under primitive conditions in the field

Dutton, H E (1902) *Brit med J*, 1, 42
[illegible]

TYPHUS FEVERS

AETIOLOGY

In this subsection are included various clinical and epidemiological types of typhus fever, all of them due to rickettsial organisms, which are conveyed from one mammalian host to another by arthropods *Rickettsia prowazeki* is responsible for the classical typhus exanthematicus well known in the Old World, it is an organism which infects man only, and the human body-louse (*Pediculus humanus*) is the vector *R mooseri*, a very similar organism, occurs enzootically in rats, but the rat flea (*Xenopsylla cheopis*) on occasions may convey the infection to man in whom it produces murine typhus, which clinically is akin to typhus exanthematicus This infection is not transmissible by the human louse, and so does not become epidemic *R rickettsi*, also, is enzootic in rodents and other small mammals, it may infect man to whom it is conveyed by the bites of sundry species of ticks, one or other of

transmitted by the human ectoparasites and so does not become epidemic

COURSE OF DISEASE

While the clinical manifestations of these forms of typhus fever differ in detail, broadly speaking they run a somewhat similar course over a period of 2 or 3 weeks Fever, toxaemia and prostration are prominent, a rash develops about the fifth

prognosis is bad in those over 40 years of age.

In addition to these better-known forms of typhus there are other typhus-like diseases of rickettsial origin, some of them only very recently described Among these are Q fever and atypical pneumonia, Bullis fever, and rickettsialpox. Trench

Adequate dosage cannot be tolerated by humans by the *mouth and given intra* venously causes a haemolytic anaemia

Para *aminobenzoic acid*

Para aminobenzoic acid was found by Snyder Maier and Anderson in 1942 to reduce the mortality from *R mooseri* infections in mice when given in large doses by the mouth early in the infection Subsequently it was shown (Hamilton Plotz and Smadel 1943) that this compound had an inhibitory effect on the growth of rickettsias in yolk sac membrane cultures In 1944 Yeomans and his co workers studied the effect of large doses of *para* aminobenzoic acid by the mouth on 20 cases of epidemic typhus during an outbreak in Egypt The dosage was initially 4 8 grammes and th s was follo ved by 2 grammes 2 ho rly to totals of from 60

of the illness its severity and duration were modified *Para* aminobenzoic acid or its sodium salt have since been extensively used in the treatment of the var ous forms of typhus and although they cannot be regarded as curative they nevertheless exert a beneficial effect on the course of the disease

Antibiotics

The antibiotics streptomycin and penicillin exert a slight inhibitory action on yolk sac cultures of rickettsia but have not proved of benefit therapeutically In 1947 after preliminary
vitro Smadel and Jackson
laboratory animals infect
typhuses of scrub fever of Rocky Mountain spotted fever of rickettsialpox and of Q fever and the drug was not toxic to these animals In 1948 some human cases of epidemic and of murine typhus in Mexico City were treated orally with Chloromycetin with most encouraging results Later in the same year a large number of patients suffering from scrub fever or mite typhus were successfully treated with Chloromycetin in Malaya The doses at first used were an initial one of 3 grammes by the mouth followed by 0 25 grammes 3 hourly for 24 hours and then smaller doses for another 4 days In every case there was an immediate clinical improvement the fever usually vanished by the second day the patients rapidly became convalescent and none relapsed It was soon established that 6 grammes of the drug given over a period of 24 hours produced an equally satisfactory result No significant

Aureomycin has been found to protect

r ketts as of Q fever Rocky Mountain spotted fever murine typhus and rickettsial

to those achieved with *para* aminobenzoic acid treatment
2–5 milligrams per kilogram of body weight were given at hourly intervals on 3

courses of cases, and but for some nausea and vomit- toxic side-effects

Hamilton H L, Plotz H, and Smadel J F (1943) *Proc Soc exp Biol, N Y*, 58 255
Ross S, Schoenbach, E B, Burke, F G, Bryer, M S, Rice, E C, and Washington, J A (1948) *J Amer med Ass*, 138 1213
Smadel J E (1949) *Bull U S Army med Dept*, 9 117
— and Jackson, E B (1947) *Science*, 106, 418
Snyder J C, Maier, J, and Anderson C R. (1942) Rep to the Div of Med Sci, Nat Res Council, U S Dec 26th 1942.
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Weigl, R (1924) *Med Klinik*, 20, 1046
Wong, S C, and Cox, H R. (1948) *Ann N Y Acad Sci* 51 290
Yeomans, A, Snyder, J C, Murray, E S, Zarafonetis, C J D, and Ecke, R S (1944) *J Amer med Ass*, 126, 349
— — and Gilliam, A G (1945) *J Amer med Ass*, 129, 19

TULARAEMIA

Tularaemia is an acute toxaemic disease, due to infe... and normally is an infe... the infection by h... adequately cooked ... be conveyed by a number of biting arthropods (... flies) which, in nature, are responsible for the transmission of the infection from animal to animal

After an incubation period of ...

TREATMENT

Prophylactic

The wearing of rubber glo... though free...

Various drugs have in the past been used in the treatment of tularaemia of these arsenicals, bismuth preparations, acriflavine and the sulphonamides have had their advocates None has proved to be of any clearly demonstrable value

Specific

A living vaccine prepared from attenuated cultures of *Bact tularense* has been employed therapeutically, with doubtful benefit

Serum

Foshay (1932) first prepared an anti tularaemic serum by immunization of goats with *Bact tularense* immune sera prepared from horses and other animals have since been used in the treatment of tularaemia, but as serum treatment has proved of rather doubtful value, and as serum reactions occur in about half of those treated with it, there has been a natural reluctance to use it as a routine in a disease with such a low mortality

Antibiotics

Heilman (1944) showed streptomycin in low concentrations to be both bacteriostatic and bactericidal to *Bact tularense in vitro*, and he found it to arrest experimental infections with this organism in rodents Foshay and Pasternack (1946) first recorded the efficacy of streptomycin in the treatment of human cases of tularaemia They advocated a dosage of 50 000–60 000 units every 3 hours for the first 4 days, and then 30 000–50,000 units 3 hourly for another 2 or 3 days Berson and Harwell (1948) published the results of streptomycin treatment of 56 cases of tularaemia, there was only 1 death among these, though 15 of the patients had pleuro-pulmonary changes, the expected mortality from which is about 30 per cent The lesion proving most refractory to streptomycin treatment was the suppurating lymph gland, this may be due to failure of the drug to penetrate necrosed glands adequately The dosages these workers employed ranged from 1 9 to 20 grammes over periods of from 4 to 18 days (1 gramme represents 1,000 000 units)

There is now little doubt that streptomycin is the most effective therapeutic agent available in the treatment of tularaemia, and that it will henceforth supplant the serum therapy

[illegible] (1948) [illegible] *med Sci*, 215, 243

[illegible] *ss* 130 393

[illegible]

UNDULANT FEVERS

INTRODUCTION

The undulant fevers include a group of specific infections due to various species of *Brucella* which are conveyed to man through the agency of raw milk and milk products, or of the discharges of infected animals *Br melitensis* infection is usually acquired from goats, and to a lesser extent from sheep, in the Mediterranean area *Br abortus* is associated with cattle infections which are world wide in distribution More rarely other species of *Brucella* (for example, *Br suis* from pigs) infect man The mortality is low

Human infe[illegible] alternat[illegible] th afebr le periods, with [illegible] much physica[illegible] be severe and may continue its undulatory course for a year or more *Br abortus* infections are more mild and rarely persist for more than 6 months The mortality is low The organisms may be recovered by bacteriological culture of the blood during the febrile periods or by guinea pig inoculation Agglutinins in high titre

satisfactory

During the febrile exacerbations the temperature is usually intermittent It begins to rise in the early afternoon and subsides after some hours This daily intermittent temperature mounts over a period of several days, with increasing prostration, and then more rapidly declines until the patient is afebrile The afebrile period may last a few days or a week or more, and the fever then recurs The successive paroxysms become more widely spaced and less severe, until eventually the disease ends Heavy sweats are usual, there is often constipation with flatulent distension, headache, generalized aches and neuralgic pains are troublesome, and the resultant insomnia leads to mental depression

Orchitis and epididymitis may be encountered in males, and ovaritis and mastitis in females Abortion does not result from the infection in women, although the pyrexia may cause this

TREATMENT

PROPHYLACTIC

Veterinary surgeons, shepherds, stockmen and slaughter men are occupationally exposed to the risk of infection The carcasses, the foetal membranes and uterine discharges of animals suffering from contagious abortion contain many *Brucella* The urine and the milk of these animals are also infective Infection from such sources may gain access to man through the mucous membranes or through

soil, but they are killed by direct sunlight in a few hours, and within a brief period by a temperature of 55 degrees C

The usual method of infection of the town dweller is the consumption of raw infected milk or milk products such as cheese Pasteurization, or boiling, of all milk is an effective safeguard against infection by this medium Although *Br abortus* is a ubiquitous infection in cattle, and much of the unpasteurized milk sold is infected, human infection with it is not very common Children below 15 years of age are largely resistant to infection, after adolescence the immunity diminishes, about 3 times as many adult males suffer from undulant fever as do females Veterinarians and others peculiarly liable to infection may be afforded some immunity by inoculation of killed cultures of the organisms The protection afforded by this means is uncertain

GENERAL

A preliminary purge and confinement to bed are necessary in the early stages during the febrile periods, but, as the severity of the attacks wanes, the patient, if otherwise well, may be able to get about when the temperature is not actually

may be given during the febrile periods to relieve the headache and pains and to ensure rest Sponging should be resorted to when the temperature reaches 104° F *Constipation*, which is often troublesome, should be treated with saline purges, and with enemas when necessary

There have been many claims that a variety of drugs have proved effective in [illegible]

run an irregular course and are self limiting

Protein shock therapy in the intermissions of the disease, as in the case of many other chronic fevers, has been claimed to stimulate antibody formation and so to hasten the spontaneous termination of the infections

Various vaccines, both stock and autogenous, have been prepared, and these also have been given in the intermissions to increase antibody formation The benefit deriving from their use is dubious A Seitz filtrate of a culture of *Brucella* grown on liver broth was claimed by American workers to be effective in 80 per cent of cases after an initial dose of 0 1 millilitre of this "brucellin" increasing doses are given at 3-day intervals on 3 occasions to produce sharp allergic reactions The injection is then repeated at 15-day intervals over a period of 6 months The satisfactory results at first claimed have not been obtained by other workers

SPECIFIC

Sulphonamides

It has been shown that the sulphonamides in toxic doses may eliminate a *Br abortus* infection in guinea pigs These drugs have proved very inconsistently effective in human cases Huddleston (1947) reported the demonstration of an enhanced inhibitive action of the sulphonamides, both *in vitro* and *in vivo* by the additive action of a weak anti serum On the assumption that all normal human blood contains some bactericidal *Brucella* antibody he suggested that treatment with a sulphonamide in conjunction with repeated transfusions of normal human blood would be effective He recorded the successful treatment of 4 cases in this manner, and others have similarly been treated (Holmes and Hughes, 1948, and Romer, 1949) with apparently satisfactory results All these infections were due to *Br abortus*, but the evidence of a specific effect of the treatment is unconvincing

Para-aminobenzoic acid

It is possible that *para* aminobenzoic acid, or sodium *para*-aminobenzoate, may prove of therapeutic value in the human infections Cotton and Swope (1948), after a demonstration of its inhibitive action on growths of *Br abortus* in cultures, successfully eradicated infections in guinea pigs with the sodium salt given sub cutaneously in doses of 5 millilitres of a 5 per cent solution 4-hourly for 3 weeks, if treatment was begun within a few days of infection The treatment was less effective if delayed for a couple of weeks after infection

Antibiotics

Of the antibiotics, penicillin appears to be of no value against the *Brucella* in fections Streptomycin exerts some inhibitive action on cultures of the organisms, and it is reported that cases of human infection with *Br suis* have benefited by its

-rapeutic use, but the other human bruceiloses have not always done so The
mbination of sulphadiazine and streptomycin was first reported on favourably
the treatment of *Br abortus* infection by Pulaski and Amspacher (1947), and
ibsequently by others The dosage of streptomycin necessary to produce the
results so far achieved has resulted in toxic side-effects in many cases, some of
... primarily the eighth cranial nerve and sometimes the central
... and a death from toxic encephalitis has been
... following the use of streptomycin
... seriously ill patients

... ptomycin, and, although
As a result ... (McCullough and Eisele, 194 ...) ... less toxic ...

The newer preparation aureomycin is less toxic ... of the Brucella group *in vitro*, this
less active than the latter against organisms of the Brucella group *in vitro*, this
compound shows considerable promise as an effective therapeutic agent Spink
and his co-workers (1948) treated 24 human cases of *Br melitensis* infection with
aureomycin by the mouth with immediate results surpassing those following any
other specific therapy they have used Provided the drug is given initially in small
doses the toxic reactions to aureomycin are slight These workers advocate on the
first day of treatment a total of 0 1 gramme, divided into 4 doses, on the second day
a total of 0 6 gramme, on the third 1 6 grammes, and on the fourth 2 grammes, and
this is repeated daily until the tenth day Other workers have confirmed the early
response to aureomycin treatment of human infections with *Br abortus*, and
Debono (1949) has now reported a similar immediate response to it in the consider-
ably more severe cases of *Br melitensis* infection he has treated in Malta Debono,
from a wide and disappointing previous experience of the treatment of the Medi-
terranean form of the disease, states that the effect of aureomycin treatment on
this infection in his hands has been constant, rapid and even dramatic While a
rapid clinical response was obtained in all these cases it remains to be seen in what
proportion of them bacteriological cure of the infections is obtained

Cotton, C M and Swope R E (1948) *Amer J vet Res*, 9 164, 169
Debono, J E (1949) *Lancet*, 2, 326
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Hunnicutt, T Graf, W J, Hamburger, M, Ferris, E B, and Scheinker, I M (1948) *J Amer med Ass*, 137 599
McCullough, N B, and Eisele C W (1949) *J Amer med Ass* 139 80
Pulaski E J and Amspacher, W H (1947) *Bull U S Army med Dept*, 7, 331
Romer C (1949) *Brit med J*, 1, 1035
Spink, W W, Braude, A I, Castaneda, M R., and Goytia, R S (1948) *J Amer me Ass*, 138 1145

YAWS

Yaws is one of several diseases closely resembling syphilis, and is due to infec
with *Spirochaeta pertenuis*, an organism morphologically identical with *S palli*
Yaws is a disease of the hot humid tropics, in some parts of which it is extre
prevalent but in others rare or absent Infection is not venereal but results
entry of the organisms through abrasions of the skin either as a result of

contact with an infective lesion or by the agency of insects ...

... various skin eruptions, and the development of further fungating crusted granulomatous skin lesions (secondary yaws), later there may follow a variety of conditions including osteitis of the long bones, multiple dactylitis, juxta-articular nodule formation, goundou, and gangosa In contra-distinction to syphilis there are no visceral lesions in yaws, and the nervous system is not affected The causative spirochaetes may be recovered by incising and scraping an unruptured yaw papule The blood Wassermann and Kahn reactions are positive in yaws, but as the central nervous system is not involved these tests are negative if performed on the cerebrospinal fluid

TREATMENT

General

Yaws is much more amenable to treatment than is syphilis, especially in the early stages when it can readily and rapidly be cured A further advantage of specific treatment for yaws is the disappearance of spirochaetes from the cutaneous lesions, the treated patient is thus no longer infective to others Mass treatment of an infected population has proved of great value in the eradication of the disease from a locality, as has been demonstrated in Ceylon Persons in the areas where yaws occurs are likely to be suffering from malnutrition, a variety of parasitic infections and other debilitating conditions These should receive suitable attention if the full benefit of specific treatment is to be expected

Specific

Arsenic

...

course is necessary as the drug is less effective in these, in the advanced secondary stages it may not prove curative

Acetarsol—Acetarsol by the mouth is quite effective in the treatment of yaws, the dose for an adult is initially 1 0 gramme daily, and this is increased to 2 or 3 grammes daily and continued for at least a week

Bismuth

Sodium potassium bismuth tartrate, sodium bismuth tartrate (Sobita) bismuth salicylate, and bismuth subgallate (Dermatol) given intramuscularly, usually in oily suspension, are widely used in the mass treatment of yaws Injections of 1½–4

...

stomatitis sometimes attends their use Bismuth salts are rather less effective than are the arsenicals in the treatment of yaws, they are employed mainly in virtue of their cheapness and ease of preparation

Penicillin

time of 6½ days Numerous reports confirming the quick response of early yaws

1947), have variously been claimed to be effective On the evidence available it would appear desirable to give the bigger dosage, when possible, as the reversal of the serological tests appears to be both more rapid and more frequent following the more massive treatment

Antimony

In patients suffering from old-standing ulcers weekly intravenous injections of a 1 per cent tartar emetic solution, beginning with 5 millilitres and increasing to 10 or 15 millilitres, may promote healing Maggot infestation and gross secondary sepsis complicating such lesions may be relieved by the local application of iodoform or of some other antiseptic dressing

Potassium iodide

This is of use in the treatment of late yaws, and its action is comparable to that in syphilis

Mercury

Although it will influence a syphilitic infection mercury has no effect on a yaws infection

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Dwinelle, J H, Sheldon A J, Rein C R, and Sternberg T H (1947) *Amer J trop Med*, 27, 633
Findlay, G M, Hill K R, and Macpherson, A (1944) *Nature*, 154, 795

YELLOW FEVER

AETIOLOGY

*occur in Asia Sporadic cases of infection of man, however, occur in largely un-*inhabited forest country, particularly in South America It is now known that the virus infects certain forest-dwelling wild animals, which constitute a reservoir of infection A number of forest mosquitoes (*Aëdes* spp *Haemagogus* spp) are capable of transmitting this jungle yellow fever The return of a human case of jungle

yellow fever to an urban area, in the presence of the usual vector, *may initiate an* urban epidemic of yellow fever of the long recognized type

CLINICAL NOTE

Yellow fever, after an incubation period of from 3 to 6 days or *even longer*, causes severe prostration with fever and toxaemia severe headache, bone and generalized bodily pains There is pronounced albuminuria with diminishing

of the disease Hepatitis and liver necrosis, haemorrhage, anuria and uraemia and cardiac failure are the graver manifestations of yellow fever

The temperature falls after some days of illness, after a remission lasting from a few hours to a couple of days it recurs in some cases for a period of 2 or 3 days, again dropping by crisis, or by lysis, so producing a "saddle back" temperature chart On recovery there is no evidence of permanent damage to the liver the kid neys or the heart, there is permanent immunity to reinfection

TREATMENT

Prophylactic

The spread of yellow fever from the present endemic areas to others free from the disease where however the insect vectors are abundant has occurred in the past Limited outbreaks of yellow fever have been recorded in many parts of the world including Great Britain With the development of rapid air travel the possibility of a repetition of this occurrence has become a major preoccupation of sanitary authorities throughout the world By aircraft, carriage of the infection might take place through the agency of a mild case or of one in the incubation period of the disease, or by the transportation of infected mosquitoes By international agreement, aerodromes in the endemic zones are maintained as free as is possible from the in sect vectors all aircraft are treated with insecticidal sprays in transit before landing elsewhere Furthermore, all passengers passing through the endemic areas are required to furnish a certificate of immunization issued not less than 10 days or more than 4 years before reaching or leaving the area By these and similar measures the spread of the disease by aircraft has so far been successfully prevented

Personal protection against yellow fever is afforded by treatment with a vaccine In 1928, Stokes, Bauer and Hudson proved yellow fever to be due to a filtrable virus Many of those first engaged in laboratory study of this virus contracted yellow fever, and some died Within a year or so Hindle (1929) prepared a vaccine which afforded some immunity to infection The method was developed by various workers and at present protection against yellow fever is afforded by the injection sub cutaneously or intramuscularly, of a culture of an attenuated living virus (17 D) grown in chick embryo, desiccated and sealed *in vacuo* or in an atmosphere of nitrogen It is kept at a low temperature and is reconstituted by dispersion in water The use of this vaccine confers a substantial immunity some 10 days after its inocu lation, and this increases until it reaches a maximum at the end of about 3 weeks The immunity lasts for several years, and possibly for life in some cases For all

practical purposes it affords complete protection to the individual against the acquirement of the disease At the present time a certificate of vaccination in most countries is held to be valid for a period of 4 years, the inoculation must then be renewed The injection of the vaccine now in use is unattended by any undesirable side-effects Its almost universal use has brought about the virtual disappearance of yellow fever as a disease of Europeans, and has largely reduced it in the indigenous populations of the endemic areas

Determination of the degree of immunity of an individual to yellow fever, either as a result of previous infection or of successful vaccine immunization, is made by the mouse protection test developed by Sawyer and Lloyd (1931) The serum of the individual under examination is inoculated into mice concdrrently with an infecting

when infection last occurred among them

General

There is no specific treatment for the established infection As in the case of other

yellow fever, call for the best nursing attention available Rigid confinement to bed is imperative, and the patient should preferably be treated in the quarters in which he is taken ill Every suspected case of yellow fever must be nursed under a suitable mosquito net, preferably in a mosquito proof room to prevent access of the insect vectors and dissemination of the infection

Early in the attack a sharp purge with castor oil is desirable, fluids should be given freely and glucose should be liberally incorporated in these, no solid food is permitted until it is certain that the patient has fully entered on convalescence, and is not merely in the remissive stage of the disease seen in some cases The vomiting and other gastro-intestinal symptoms should be controlled so far as is possible by sipping iced drinks and by the use of atropine Five per cent glucose in saline

venously, is given to counteract the guanidine intoxication which occurs as a result of liver necrosis

A R D ADAMS

Hindle, E (1929) *Trans R Soc trop Med Hyg*, 22 405
Sawyer, W A, and Lloyd W (1931) *J exp Med*, 54, 533
Stokes, A, Bauer, J H, and Hudson N P (1928) *J Amer med Ass*, 90 253

VENEREAL DISEASES

GONORRHOEA

Although attempts to develop chemotherapeutic measures in the treatment of gonorrhoea by the intravenous injection of mercurochrome or various acridines have been made, no real advance in the efficiency of treatment was achieved until the introduction of the sulphonamides in 1937 Sulphanilamide, the earliest and simplest of these compounds, possessed only a moderate antigonococcal action Of the many sulphonamide compounds introduced within the next few years, sulphapyridine, sulphathiazole and sulphadiazine proved to be very effective for gonorrhoea In the treatment of large numbers of cases of acute uncomplicated gonococcal urethritis in men, successful results have been reported in as many as 90 per cent after a f...

spread of sulphonamide-resistant strains of the gonococcus Some of these strains were thought to be of natural occurrence, but of others there was good reason to believe that their resistance had been produced by treatment with small and inefficient amounts of the sulphonamide compounds

The application of penicillin to the treatment of gonorrhoea soon showed this antibiotic to be extremely effective, not only in previously untreated infections but also in sulphonamide resistant infections Much work has been done to discover the most efficient practical schedule of dosage and period of treatment Most of the early trials of penicillin in gonococcal infections were conducted in military hospitals where penicillin was given in 3-hourly injections spread over several days, and later condensed into a 24-hour period with a total of about 150,000 units

For the treatment of ambulant cases in civil life the same total amount of penicillin was given by multiple injections within 9–12 hours and, later, compressed into 3–5 hours, with little loss of efficiency

The difficulty of many patients in attending for these long periods and the desirability of preventing the extremely rapid excretion of penicillin led to the investigation of methods of delaying the absorption of the penicillin, including that of combining penicillin in low release vehicles An effective and widely used preparation is the penicillin in oil and wax advocated by Romansky and Rittman in ...

TREATMENT OF ACUTE UNCOMPLICATED GONORRHOEA

The general measures include the avoidance of strenuous exercise or manual work Horse riding and bicycling in particular are prohibited The patient should be advised to rest in bed for at least the first 2 days of the treatment Alcoholic

ments should be avoided

SULPHONAMIDES

Of

This

gram

effects of the drug, such as headache, anorexia or nausea, and instructed that the treatment should not be interrupted, except for oliguria, without medical advice. After such preliminary advice there is rarely any interruption of treatment

The success of treatment is indicated by the cessation of discharge within 48 hours, the urine, however, may contain a few threads or be slightly hazy for several days afterwards The patient must be warned, in no uncertain terms, that however rapid the effect of treatment seems to be the full course of sulphathiazole tablets must be completed Many failures of sulphonamide therapy are due to

same sulphonamide is successful

PENICILLIN

The absence of toxic effects and the certainty of the dosage when injections are given, render penicillin the treatment of choice for acute gonococcal infection (*see* the risk of masking syphilis, page 1316) Excellent results are given by aqueous sodium penicillin in doses of 50,000 units at intervals of 2–3 hours to a total of 200 000 units, or by one single injection of 300,000 units of calcium penicillin in oil and wax or procaine penicillin in oil The discharge usually ceases in 24–36 hours, but,

urine may p

second or t

treatment is rarely required but some infections appear to be stubborn and require a higher dosage of penicillin and the addition of sulphonamide therapy

TESTS AFTER RECOVERY

Periodically repeated thorough clinical and bacteriological examinations are required during a period of 3 months for men and 6 months for women, after apparent recovery from acute uncomplicated gonorrhoea

In the male, these tests include clinical examination, macroscopic inspection of the urine for any threads or debris, and microscopical examination of stained films of the urethral and prostatic secretions and of cultures of these secretions at

the first, second and third months after treatment After the first month alcoholic drinks and hard exercise may be resumed

For women the bacteriological tests comprise examination of films and cultures of secretions from urethra and cervix at monthly intervals for 3 months, these are most efficient when performed immediately after the menstrual period Films and cultures from the rectum should be examined on at least one occasion

MASKING OF SYPHILIS

Penicillin in the dosage stated may mask or delay the development of concomitantly acquired syphilis It is therefore advisable to make serological and clinical

which the total amount of penicillin does not exceed 125 000 units This low total

Pregnancy

The possible tragedy of masked or delayed syphilis during pregnancy, with infection of the foetus, when penicillin has been given for gonorrhoea earlier in the pregnancy renders it advisable to treat gonorrhoea in the pregnant woman with

examination

TREATMENT OF ACUTE COMPLICATIONS

Gonococcal infection has a natural tendency, when uncontrolled by treatment to spread to the genital glands within a few weeks Acute involvement of the prostate gland, Fallopian tube or epididymis requires special measures Rest in bed in the Fowler position is necessary Copious fluids should be given except during penicillin therapy Omnopon, $\frac{1}{6}$ grain, may be given when pain is severe, for epididymitis and salpingitis, kaolin poultices are also useful in controlling pain In

which may be needed over several days, a ... prostatic abscess usually ruptures spontaneously o the rectum, with speedy relief of symptoms Gonococcal proctitis seems to be surprisingly uncommon after rupture of an abscess into the rectum but special bacteriological tests must be done to prove the absence of infection

[illegible] abscesses ar[illegible] from infection of the urethral follicles in [illegible] solve with [illegible]

For all of these complications penicillin should be given in doses of 300,000 units once daily for at least 3 days

In these acute complications the subsidence of the prominent symptoms and the resolution of the swelling together with the re-establishment of free drainage from the congested organ often releases gonococci which have so far remained inaccessible to penicillin Additional penicillin therapy or the use of a sulphonamide is therefore usually necessary for the mild chronic infection which remains when the acute stage has subsided

GONOCOCCAL ARTHRITIS

Gonococcal arthritis has become, fortunately, a rare complication since the introduction of the sulphonamides and of penicillin Rest in bed is required but on account of the tendency of the plastic periarthritis to lead to fibrous ankylosis, immobilization of the affected joints by splinting is best avoided Fixation by sand bags usually provides sufficient rest to the joints Pain may be relieved by radiant heat or kaolin poultice and by Omnopon, ⅓ grain, orally Penicillin should be given immediately in 3 hourly injections of 50,000 units for at least 6 days, or of 300,000 units of procaine penicillin once daily for 6 days In subacute and chronic arthritis good results may be obtained from the use of fever therapy—T A B vaccine, 25–50 million organisms intravenously every 3–4 days on 3 or 4 occasions

ACUTE GONOCOCCAL IRITIS

Acute gonococcal iritis may accompany the arthritis but more often occurs separately In order to prevent posterior synechiae, it is imperative to achieve full dilatation of the pupil by local atropine instillation as soon as possible Penicillin should be given as for cases of arthritis Dilatation of the pupil must be maintained for several weeks after the subsidence of symptoms

CHRONIC GONORRHOEA

Chronic gonorrhoea in the male is usually due to a chronic infection of the urethral follicles in the anterior urethra or to the persistence of infection in the prostate gland or seminal vesicles, from all of which the natural drainage of the inflamma tory products is restricted and the response to any treatment is slow In women,

cause arthritis or iritis

These chronic infections are often refractory and require more energetic and

cases this treatment may have to be repeated, or fever therapy, with T A B vaccine 25–50 million organisms intravenously, may succeed Persistent or relapsing gonorrhoea in the male is sometimes due to the formation of a soft stricture in the vicinity of chronically inflamed urethral follicles When this condition is recognized, as it may be with certainty only on urethroscopy, dilatation with metal bougies should precede any further chemotherapy A useful method is to perform

dilatation once a week for 4–6 weeks, each dilatation should be followed by procaine penicillin 300,000 units in oil and wax Daily urethral irrigations with potassium permanganate 1 · 8,000 are also helpful

In men chronic infection is usually located in the prostate gland and is difficult to eradicate Prolonged treatment by prostatic massage twice weekly, to promote and maintain drainage of the alveoli, will be required for many weeks Procaine penicillin in oil 300,000 units, is given immediately after each massage Short courses of sulphonamide therapy may also be required Repeated microscopic examination of the prostatic secretion is necessary to ascertain the degree of the remaining infection

Chronic cervicitis in women is invariably present after subsidence of acute salpingitis and is difficult to eradicate Repeated courses of penicillin and of sulphonamides may be needed When all clinical signs of infection have receded bacteriological tests of the secretions of the urethra, cervix and rectum must be made, first at weekly intervals and later at monthly intervals, for 6 months The cervical secretions are most efficiently tested immediately after the menstrual period

GONOCOCCAL OPHTHALMIA

This condition is usually seen as ophthalmia neonatorum but occasional cases are met with in adults The disease in infants may be treated entirely with pure penicillin by local instillations but the full technique is very exacting and demands a very capable nurse It consists of instilling one drop of pure penicillin solution (10,000 units per millilitre) every minute for 30 minutes This is followed by 6 instillations at 5-minute intervals, 6 at ½-hourly intervals, 6 at hourly intervals, and 6 at 2-hourly intervals

TRICHOMONAS VAGINALIS

In women, vaginal infestation with *Trichomonas vaginalis* is a very common accompaniment of gonorrhoea The vaginal discharge is usually more copious, frothy and irritating than when solely due to the gonococcus The condition is unaffected by any of the sulphonamides or by penicillin It is treated by the insertion into the vault of the vagina of 2 tablets containing acetarsone each night for a week The trichomonad is difficult to eradicate and relapses are frequent

VULVO-VAGINITIS IN CHILDREN

... lower vagina and not uncommonly ... cations fortunately are ... enicillin, 100 000 units ...

child should be kept in bed Local swabbing with a very mild antiseptic ... followed by a dusting powder is the only local treatment required *Precaution* ... tests ... umed

after the eye appears normal

Romansky, M J , and Rittman, G E (1944) *Science*, 100, 196

GRANULOMA INGUINALE (ULCERATING GRANULOMA OF THE PUDENDA)

The very favourable reports of the efficacy of streptomycin in the treatment of this

treatment The most satisfactory dosage is 4 grammes daily, in 4-hourly doses, for 5 days Donovan bodies disappear from the lesions in 5–9 days complete healing is achieved in 3–4 weeks

Zimmermann and Smith (1948), who treated 85 cases, recommend additional penicillin therapy and sitz baths of potassium permanganate 1 32 000 dilution, when gross ulceration and infection with secondary organisms are present

Recurrence after streptomycin therapy is infrequent and may respond to a second course of this remedy Aureomycin, orally in doses of 250 milligrams 4 times daily for 5 days, was effective in 4 streptomycin resistant cases (Greenblatt and his colleagues, 1948)

E LLOYD

Greenblatt R B Dienst R B , Chen, C , and West R (1948) *Sth med J Nashville*, 41, 1121

LYMPHOPATHIA VENEREUM

DEFINITION

climates than in the temperate zones, where it does not flourish It is characterized

these glands is associated with marked periadenitis, the glands tend to undergo multiple focal necrosis, with the development of stellate abscesses Involvement of the lymphatic glands in the pelvis, prone to occur in women with an initial lesion in the vault of the vagina, may give rise to a genito-ano rectal syndrome (*esthiomene*) The infection normally tends to be self-limiting, and the mortality is low

DIAGNOSIS

A diagnosis is made on the clinical findings and history, on tests based on the immunological changes occurring in the disease—the Frei test is that most commonly employed—and, when practicable, on recovery of the virus

TREATMENT

GENERAL

Complete rest in bed, however well the patient may feel, should be insisted on as a first measure in treatment In males, with a primary sore on the external genitalia and moderate enlargement of one or of a few glands in one groin, rest in bed will result in subsidence of the swellings and the termination of the condition in over 50 per cent of the cases If after complete rest for a couple of weeks the glands have not begun to subside, or if they continue to enlarge and the number involved in-

persist for a year or more On no account must the glands be incised, as the resultant granulating wound will persist for a long period, and eventually heal with much scarring

In cases treated by rest, and possibly with aspiration, protein shock therapy on repeated occasions by the intravenous injection of T A B vaccine or by other means may expedite resolution

The treatment of the genito ano rectal syndrome, when this has developed, is palliative and largely surgical

SULPHONAMIDES

In 1939 Earle recorded the successful treatment of 2 cases of lymphopathia venereum with sulphapyridine in doses of 3 grammes daily Other workers have since reported on the use of this and of other sulphonamides The evidence that the sulphonamides exert a specific action on the course of the infection is not convincing, nevertheless their use is usual in the absence of any more effective drug treatment Both sulphonamides and penicillin may be employed to combat the secondary bacterial infection of the pelvic organs usual in the genito-ano-rectal syndrome

ANTIBIOTICS

Penicillin exerts no influence on the course of a lymphopathia venereum infection Aureomycin, on the other hand, had been shown by Wright and his

weeks' to 2 years' duration in 8 Negro patients were markedly reduced in size by the fourth day of treatment, an acute lymphogranulomatous proctitis in 3 patients very rapidly subsided, and improvement was noted in the local condition of 14 patients with chronic rectal strictures due to infections of from 2 to 26 years' standing These workers gave the drug in daily doses of 10 or 20 milligrams intramuscularly, to totals of from 80 milligrams to 1 gramme The drug was administered in 2 millilitres of isotonic saline solution, and not in the diluent supplied which caused a hypochromic anaemia, though this, if it developed, was readily controlled by a folic acid iron compound (Folvron) Wright and his co-workers consider the early response of lymphopathia venereum to aureomycin to be unequalled by that following any treatment hitherto advocated, and this view has subsequently been confirmed by other workers Finland, Collins and Paine (1948) in clinical trials of aureomycin gave the drug orally in doses of up to 250 milligrams 8 hourly for 31 days They found the toxic side-effects to be minimal and infrequent, the commonest were a looseness of the bowel, not amounting to actual diarrhoea, and nausea and vomiting

A. R D ADAMS

Earle, K V (1939) *Lancet*, 1, 985
Finland M Collins H S, and Paine T F (1948) *J Amer med Ass*, 138 946
Wright, L T Sanders M Logan M A, Prigot, A, and Hill, L M (1948) *J Amer med Ass*, 138 408

SYPHILIS

INTRODUCTION

The general management of the syphilitic patient is dependent to a marked

which needs judicious assessment in deciding which remedies are appropriate and how they should be used—what advice should be given and how closely it can be followed and what prognosis can be offered and when it can be attained

The aim of medical treatment includes public health and domestic aspects as

which will limit the risk of spread of the infection to others inside the home and without The individual outlook requires treatment which will promote rapid healing of the lesions and eradication of the infection with as little interference as possible with the daily work and routine of the patient Conditions of confidence and secrecy are to be maintained

From the practical point of view it is important to realize that although no routine plan of advice and treatment is applicable to all patients, there are some general principles which are essential in the management of every patient suffering

of observation is necessary, in some cases observation may need to be made for the remainder of the patient's life

The present-day treatment of syphilis is based upon the use of a combination of two well tried remedies—the organic arsenical compounds and bismuth—to which has recently been added penicillin, a compound of undoubted but of incompletely assessed anti syphilitic value

ORGANIC ARSENICAL COMPOUNDS

Trivalent Arsenicals

Arsphenamine, originally introduced under the name of Salvarsan, is a trivalent organic arsenical compound—the dihydrochloride of diamino dihydroxy arseno-benzene—which contains about 30 per cent of arsenic As Salvarsan or 606 it achieved world wide fame soon after its introduction by that pioneer of chemo therapy Paul Ehrlich in 1910 Although the reports of its speedy healing effect on

prepare and must be given intravenously by the slow gravity method, it is now seldom used

The toxic nature of the original arsphenamine (Salvarsan) led to the production, in 1912, by Ehrlich of Neo Salvarsan (914) now well known as neoarsphenamine This organic arsenical—the sodium salt of diamino dihydroxy arsenobenzene methylene sulphoxylic acid—is a yellow powder containing about 20 per cent of arsenic It has the great advantage of simplicity in the preparation of its solution ... It is appreciably less toxic than ... although its efficacy is

... lar injection, is a slight modification of neoarsphenamine and is a useful arsenical when intravenous in

that of the original arsphenamine, doubtless because their effective dose ... is of considerably less weight than that of arsphenamine or neoarsphenamine so that the amount of arsenic injected is about one tenth of that used when arsphena mine is given

These compounds are excreted more rapidly than arsphenamine and should be injected twice or three times a week in order to attain their full action

All these trivalent organic arsenicals are supplied in powder form and should be dissolved in cold sterile water immediately prior to use

PENTAVALENT ARSENICALS

[illegible]

infants, by whom it is tolerated better than by adults

Acetylarsan (diethylamine acetarsone), a derivative of acetarsone, is supplied in a stable solution ready for injection It does not possess the vigorous action of the arsphenamines but its ease of administration by intramuscular injection and its freedom from any severe toxic effects render it a useful preparation for the treatment of congenital syphilis and of many of the late manifestations of acquired syphilis, particularly in elderly patients. On account of its rapid excretion it should be administered twice weekly to obtain its full effect

[illegible]

3 grammes is remarkably large compared with that of arsphenamine or neoars- [illegible] amide than are found after injection of the arsphenamines

CHEMOTHERAPY OF THE ORGANIC ARSENICAL COMPOUNDS

The arsphenamines and allied arsenical compounds possess a powerful antisyphilitic action although the mechanism by which they exert this action is not clear

Ehrlich thought originally that the activity of the arsphenamines was due to a direct action but considerable doubt was cast on this conception by the early *in vitro* investigations Later it was shown by Voegtlin and Smith (1920) that the production of an oxidation product, arsenoxide, was probably necessary in order to achieve activity. The activity of arsphenamine is neutralized by the addition of sulphydryl compounds such as cystine and glutathione, and it has been suggested that this activity depends upon the affinity of arsphenamine for sulphydryl groups within the treponema

Recently, however, it has been demonstrated (Eagle, 1938) that the trivalent arsenicals exert a marked spirochaeticidal action *in vitro* at the end of 2–3 hours contact The concentration necessary to immobilize 50 per cent of the spirochaetes *in vitro* at the end of that period was found to be as low as 1 in 1,000,000

[illegible]

stage—the nodular syphilides and gummas—are also speedily resolved and healed by these remedies These rapid effects became known to the medical world in the first few years subsequent to the introduction of Salvarsan but the occurrence of relapses of syphilis in many cases led to the use of repeated injections to overcome the liability to relapse and to effect permanent cure

TOXICITY OF ARSENICAL COMPOUNDS

astically but most indiscriminately for young and old patients, and in all varieties

that the German Government made official inquiries in 1914 and in 1917, into the dangers of Salvarsan The Medical Research Council in Great Britain published an extensive report on the subject in 1922 Since these inquiries and publications the arsphenamines have been used more judiciously

The toxic action of these compounds on the human body, particularly when many

the treatment of syphilis

Gastro-intestinal Reactions

Nausea and, more rarely, vomiting, either during or immediately following an intravenous injection, are common occurrences Very frequently this is due to the unpleasant metallic taste which is experienced by some patients during the injection and it may be prevented by permitting the patient to smoke a cigarette or suck a peppermint sweet while the injection is being given *Occasionally mild* diarrhoea follows some hours later

Vasomotor Reactions

Following the first or second intravenous injection, and rarely after later injections, an acute vasoparetic reaction occurs which, on account of the similarity of its symptoms to those produced by the inhalation of amyl nitrite has been termed the "nitritoid crisis" The reaction occurs during or immediately after an intravenous injection of an arsphenamine compound

The nitritoid reaction consists of the sudden onset of dyspnoea heralded by a short cough or pain in the chest, dilatation of the pupils, followed rapidly by cyano-

the face and hands may follow and an urticarial eruption is also occasionally se
The cause of this reaction is not clearly understood although too great a speed of injection and subsequent intravascular agglutination of red blood cells are suspected

agents. Treatment is by intravenous injection of 5–10 minims of 1 : 1,000 adrenaline. The patient should be kept warm and should rest on a couch or in bed for some hours. These nitritoid reactions rarely recur, but even so further injections of arsenicals should be given very slowly and in a small dosage at first. If the reaction has been severe further treatment with arsenicals should be by intramuscular injection rather than intravenous

JARISCH-HERXHEIMER REACTION

do

In early cases of syphilis the reaction is of little importance and does not influence *the successful course of treatment which should be continued* *The only danger that* exists is that this reaction may be mistaken for one of arsenical intolerance and, as a result of this erroneous view, that arsenical treatment may be inadvisably interrupted.

heimer reaction, that is to say a temporary increase in size and activity of the lesion, may be of considerable importance in the treatment of the more destructive lesions of the later stages of syphilis, particularly when these affect vital structures.

It is the fear of a local Herxheimer effect which leads to considerable caution in the use of the arsenical remedies and nowadays should lead to even greater caution in the use of penicillin, in the treatment of late syphilis of vital structures such as aortic disease, aneurysm, syphilitic meningitis, meningo-vascular syphilis and lesions of the larynx and trachea

The reaction may be avoided in these late cases by preliminary treatment for a few weeks with potassium iodide and injections of bismuth, and then by initiating arsphenamine treatment with very small weekly doses (0 1 gramme) which are

CUTANEOUS REACTIONS

Members of the arsphenamine series are liable to produce a wide variety of toxic cutaneous manifestations varying from trivial transitory eruptions to the severe and sometimes fatal acute exfoliative dermatitis

Herpes febrilis and herpes zoster occasionally appear during arsenical therapy, the latter usually at the end of the first or during the second series of injections. They are not, strictly speaking, of direct arsenical origin, are not accompanied by

therapy, occasionally there is also a sore throat and general enlargement of lymph *nodes or jaundice* The condition usually occurs between the 7th and 12th days and most frequently on the 9th day after the first arsenical injection, it is termed "erythema of the 9th day" and is associated with the name of Milian who described it *in 1917*

Ninth-day erythema differs in some ways from arsenical dermatitis in being self limiting and disappearing in 3–4 days, in avoiding the face and neck and being *non-irritating, and in not being followed by desquamation It does not recur with* further arsenical treatment

During the first 3 or 4 weeks of arsenical therapy various other cutaneous eruptions are frequently seen *Some of these are evanescent and trivial but they are* warnings of the patient's intolerance to repeated injections of arsenicals The physician should closely interrogate and examine the patient for any cutaneous lesions throughout arsenical therapy

Arsenical dermatitis may at first be mild in degree and slow in development It may take the form of a papular eruption of limited extent often confined to the back of the hands and forearms and resembles lichen planus More frequently there is a generalized erythema often of morbilliform type but pyrexia is absent and itching is usually a prominent and persistent feature A few days later the rash fades and a fine desquamation takes place These mild cutaneous reactions must be regarded with great suspicion, further arsenical injections should be omitted

In other cases acute exfoliative arsenical dermatitis develops without warning

when intense, broncho-pneumonia supervenes Mild jaundice or colitis indicates affection of the alimentary canal Renal irritation is not common but casts and red

may last 6–10 weeks As the condition progresses a profuse desquamation takes place and exfoliation is extensive The hair, eyelashes and eyebrows are often shed

Less frequent than the above skin lesions are the localized lichenified pigmented patches of cutaneous induration known as "fixed" arsphenamine dermatitis They occur most commonly in the popliteal or antecubital fossae and may last for many *months, recurrence or exacerbation after* additional arsenical therapy is frequent

Mild or severe palmar and plantar hyperkeratosis with persistent desquamation is an uncommon but troublesome chronic arsenical complication The condition is indolent and persistent, particularly in manual workers

The incidence of all types of arsenical dermatitis is $\frac{1}{2}$–1 per cent In acute exfoliative dermatitis from arsphenamines fatalities have varied from 5 per cent to 20 per cent of cases Arsenical dermatitis is considered to be largely a manifestation of epidermal sensitiveness of the delayed cellular type rather than primarily a toxic reaction

Prevention and treatment of arsphenamine dermatitis

[illegible]

mine solution at the beginning or at the end of an intravenous injection as there is evidence that this act may sensitize the skin to future therapy The presence of other cutaneous disorders or a history of recurrent cutaneous lesions should always lead the physician to use arsphenamines cautiously Blonds especially women, are less tolerant to these compounds than brunettes The development during arsenical treatment of pruritus for which an obvious cause cannot be found should lead to at least a temporary cessation of arsenical therapy, as also should the appearance of irritating papules on any part of the body

The milder varieties of arsenical dermatitis are best treated locally with calamine or Ichthyol cream More severe cases of the exfoliative type need skilled nursing in hospital, scrupulous cleanliness of the skin surface is essential and bland baths of starch or oatmeal are comforting Former remedies have now been replaced by the use of 2, 3 dimercaptopropanol (BAL) This compound is provided in ampoules *containing 5 per cent BAL in arachis oil containing 10 per cent benzyl benzoate* The following dosage by intramuscular injection is recommended

First day, 1 ampoule (2 millilitres) 4 times at 4 hourly intervals, on the second, third, and fourth days 1 ampoule is given morning and evening 1 ampoule is given once daily on the fifth and sixth days The average time for definite improvement in exfoliating cases is 3 days

The occurrence of arsenical exfoliative dermatitis precludes for ever any further attempt to use organic arsenical remedies

BLOOD DYSCRASIAS

Injury to the haemopoietic tissues is fortunately among the rarer types of arsphenamine toxic effects Three main varieties are recognized

[illegible]

reveal a marked reduction in the number of platelets In severe cases there may be a

[illegible]

throat and mouth which develops rapidly into a sloughing necrosis of the walls of the buccal cavity and pharynx Pyrexia and toxaemia are marked in degree There is considerable swelling of the cervical glands Differential blood cell counts

reveal a marked decrease in or in severe cases a complete absence of the granu

severe progressive anaemia with varying degrees of thrombocytopenia and granu locytopenia When untreated such cases nearly always end fatally In aplastic anaemia repeated blood transfusions should also be given and may be necessary for many weeks In all cases of blood dyscrasia arsenical injections should be prohibited for ever

ARSENICAL ENCEPHALOPATHY

Acute arsenical encephalopathy is a dangerous treatment reaction which is responsible for more fatalities than the total of all other deaths from arsenical treatment It occurs early in treatment most commonly a day or two after one of the first 3 injections and usually in young adults in the earlier stages of syphilis In women the majority of cases have occurred during pregnancy

The condition begins as a headache which becomes progressively more intense and the patient often becomes remarkably irritable and apprehensive Vomiting mental confusion and epileptiform episodes ensue within 48 hours Pyrexia is of marked degree and the patient soon becomes comatose Without treatment the death rate is high (75 per cent) at necropsy multiple punctate haemorrhages and cerebral oedema may be seen

Treatment consists of immediate cerebrospinal drainage and venesection The cerebrospinal fluid pressure is raised and the protein content is very high Globulin is not present in excess and the Wassermann and Lange reactions are usually negative Injections of adrenaline are helpful and a few cases seem to have been ... mercaptopropanol (BAL) The patient should be

... of the organic arsenicals such as peripheral ... phy is usually associated ... ment with this pentavale ... d for signs of restriction which if present should be regarded as a warning to cease treatment

POST ARSPHENAMINE JAUNDICE

Jaundice is a complication well known to occur during or soon after a course of arsenical injections It is very uncommon during the first few weeks of treatment but slight jaundice may occur within a day or two of an attack of acute enteritis precipitated by one of the first few arsenical injections The jaundice is mild and soon disappears

In most cases of post arsphenamine hepatitis the jaundice is of delayed type and occurs between the eighth and twentieth weeks It may appear during arsenical treatment or many weeks after the end of a series of injections There are certain prodromal symptoms which will often warn the physician of impending jaund ce These are malaise nausea anorexia joint pains and slight digestive disturbance there may not be any pyrexia There is almost invariably an excess of urobil n and the van den Bergh test is positive

In severe cases the jaundice is moderately deep, the liver is enlarged and tender, the urine contains bile and the stools are clay coloured Rarely the condition progresses to acute hepatic necrosis and speedy death

Formerly the jaundice was ascribed to a delayed toxic effect, from accumulation of arsenic, upon the hepatic cells, but for many years it had been realized that the jaundice seemed to bear no obvious relation to the size of the arsenical injections or the number of injections given It is known to occur after only one or two injections and is almost unknown during a fourth or later series of injections It has always been very rare in congenital syphilitic children, who are usually treated by intramuscular injections, and is very uncommon in adults after intramuscular arsenical therapy It has long been noted that the frequency of arsphenamine jaundice tends to vary with the local incidence of infective jaundice, and occasionally outbreaks of arsphenamine jaundice in venereal disease hospitals have presented epidemic features During World War II, when the incidence of jaundice was greatly increased in Army venereal disease hospitals, suspicion crystallized into opinion that post arsphenamine jaundice behaved remarkably like infective jaundice in its epidemic, clinical and pathological features and that it differed in no clear way from homologous serum jaundice Refinements in syringe sterilization and a more

under treatment for syphilis Whenever jaundice is suspected or evident it is wise to interrupt arsenical therapy at once The treatment is that of infective jaundice (page 961)

BISMUTH

The value of bismuth by injection in the treatment of syphilis was first demonstrated in 1921 by Sezerac and Levaditi who used the sodium potassium tartrobismuthate Since then bismuth has slowly but surely replaced mercury in anti-syphilitic therapy Its therapeutic efficiency, although not approaching the *speedy action of arsphenamine, is considerably greater than that of mercury* Bismuth has a direct spirochaeticidal action On the addition of soluble bismuth salts to chancre fluid rich in spirochaetes Eagle found that spirochaetes are immobilized by bismuth in dilutions of from 1 50 000 to 1 225,000 in 1–2 hours

The rate of absorption of bismuth from the site of intramuscular injection (it is *too toxic for intravenous use) varies with the type of compound used The water* soluble compounds are more rapidly absorbed than suspensions of the insoluble compounds in oil or water but have the disadvantage of causing local pain

After repeated injections, bismuth is found in the kidneys, liver, heart, lung, spleen and brain Elimination, which is slow, is in the urine and faeces Moderate amounts are excreted during the first week after an injection, and after multiple injections bismuth can be detected in the urine for many months The absorption of bismuth when the insoluble compounds are given is slow and at times irregular, x-ray examination has shown that traces of bismuth may persist at the site of injection for as long as 15 months Treatment with bismuth is therefore not controllable to the same extent as other remedies used for syphilis Fortunately, it is relatively free from severe toxic effects

The confusing medley of available bismuth compounds can be divided into three main groups

Water-soluble Compounds

Water-soluble compounds, such as sodium bismuth thioglycollate (*Thio Bismol*) are rapidly absorbed and eliminated They need to be injected three times a week to ensure a continuous action

Oil-soluble Compounds

Compounds such as bismuth butylthiolaurate (Neo Cardyl), and basic bismuth σ-carbethoxy *cyclo* hexanyl acetate (Stabismol) are absorbed with moderate rapidity and are less painful than the water-soluble compounds

Insoluble Salts and Suspensions

Suspensions of metallic bismuth in a freely divided state in glucose solutions or suspensions of bismuth oxychloride are extensively used These suspensions are slowly absorbed and one injection each week is sufficiently frequent to ensure a slow continuous action

Toxic Effects

Toxic effects of bismuth therapy are infrequent especially after the use of the slowly absorbed insoluble preparations The appearance of a dark line on the gum margin, from deposition of bismuth sulphide, is relatively common after prolonged bismuth therapy Gingivitis and stomatitis are uncommon except in the presence of pyorrhoea, and are treated by frequent use of a mouthwash or spray of

Sulphurated Potash	1 gr	0 06 g
Spirit of Peppermint	5 min	0·3 ml
Distilled water, to	1 fl oz	30 ml

Pyorrhoea and dental sepsis should be treated by a dental surgeon before bismuth treatment is commenced

Method of Injection

The slow action of bismuth and its continuous absorption after the injection of the insoluble preparations renders it an admirable partner to the arsenicals The

should be used alternately The injection is given while the patient is standing and bending forward The gluteal muscles are relaxed on the side for injection by the patient bearing his weight on the opposite limb After painting the site with tincture of iodine, a sterile intramuscular injection needle, of No 20 Imperial standard wire gauge and 1¼ inches long, is thrust deeply into the muscles at a right angle to the skin with a quick stabbing movement The skin should have been drawn to one

side over the muscle in order to provide an automatic sealing of the puncture after withdrawal of the needle If the po nt of the needle is felt to strike bone it must be withdrawn slightly to avoid placing the bismuth in contact with the periosteum—a very painful proceeding (Figs 40 and 41)

When the needle has been inserted and this is done separately it must be in spected to see if any blood appears This is an indication that the needle point is in the lumen of a blood vessel The needle should then be removed and a fresh stab



FIG 40 —X ray photograph of mult ple depos ts of b smuth oxychloride correctly placed in the bu tock

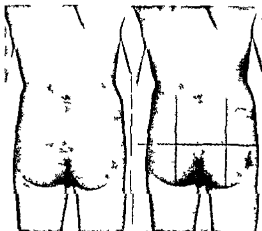


FIG 41 —Surface marking of the appropriate s te for intramuscular inject ons of b smuth in the upper and outer quadrant of the buttock

made at another site Finally when the loaded syringe is attached to the needle *in situ* the plunger should be withdrawn to make one further check on the presence of blood in the needle This double precaution is of great importance because the entry into a blood vessel of the bismuth suspension with its comparatively large particles may cause emboli a few fatalities have been recorded from such an accident In fat patients the injection of bismuth into the thick fat layer situated over the buttock muscles must be avoided as it is liable to produce painful nodules and sometimes an abscess

PENICILLIN

The value of penicillin in syphilis was demonstrated in December 1943 by Mahoney Arnold and Harris who showed that with 3 hourly intramuscular injections of aqueous sodium penicillin over a period of 7½ days the lesions of primary

n a chancre within 2–3 days A great amount of work has been done on syphilis in man and experimentally in the rabbit to ascertain the optimal dosage of penicillin n syphilis

When it became clear that unlike the arsphenamines penicillin was devoid of material toxic effects the amount given for syphilis was increased in an attempt to ffect a 100 per cent cure rate Variations have also been made in the time interval between injections and in the number of days of treatment Some of these trials and heir results are indicated below (Committee on Medical Research and the United States Health Service 1946)

Effect of 3 hourly injections of penicillin for 7½ days in early syphilis

Total units	*Relapse within 11 months*
	per cent
60 000	62
300 000	42
600 000	26
1 200 000	18
2 400 000	15

Attempts to obtain a cure of syphilis with a very large dosage of penicillin in a hort period have not met with much success When penicillin in the range of 0–25 million units is given during a 24-hour period the apparent curative effect s followed by a relapse in many cases

ll followed by relapse in about 50 per cent of the cases Clearly high dose short period treatment is not the best method

Intensive study of many variations of dosage time interval and period of treatment has failed to indicate the optimal method of using penicillin in syphilis All

methods used so far have been followed ultimately by relapse in some cases In an extensive analysis of 40 000 cases of early syphilis treated with penicillin only, Earle Moore found that the failure rate at 18–24 months was 25–35 per cent This *failure to eradicate syphilis with penicillin therapy has led to the addition to the* schedule of treatment of the arsphenamines which, in the first flush of enthusiasm for the new antibiotic, had almost been abandoned

many cases in urgent need of treatment

The necessity for treatment on an ambulant basis has stimulated inquiry into methods of delaying absorption of penicillin and maintaining a low but effective blood level of penicillin This was first attained by the method of incorporating penicillin in bees wax, subsequently emulsified in arachis oil to facilitate injection, developed by Romansky and Rittman in 1944

The release of penicillin from the penicillin-oil wax injections is slow and its

for 18–24 hours

Thomas and Cooper used penicillin oil wax therapy alone in 802 cases of early syphilis to which they gave 600,000 units once daily for 8 days (total 4 800,000 units) In a surveillance period of eleven months, failure was reported in 6 8 per cent of the cases in the sero negative primary stage and in 12 6 per cent of those in the secondary stage

Further progress in maintaining prolonged therapeutic blood levels of penicillin has been achieved by the use of procaine penicillin G in oil, and more recently by procaine penicillin in oil with 2 per cent aluminium stearate The latter has produced desirable blood levels of penicillin for 2–3 days after a single injection (Emery and his colleagues, 1949)

These slow release preparations are used extensively in venereal disease clinics in conjunction with arsenicals and bismuth

SPECIFIC TREATMENT

The aim of treatment from all aspects—individual, domestic and public health—is not only to heal infectious lesions but to eradicate the infection Although the arsphenamines and penicillin when used alone are undoubtedly capable of eradicating syphilis in its early stages in some cases, this result cannot be attained in every case For this reason all three remedies penicillin, arsphenamines and bismuth are

object being to prevent further destructive action and to restore the health of the patient as completely as possible

Early Syphilis

The prognosis in the early stages of syphilis is markedly affected by the duration of the infection and it is considerably more favourable when treatment is started in the primary stage and before the Wassermann reaction has become positive In this early stage the suspected chancre can be proved to be syphilitic only by finding *Spirochaeta pallida* by dark-field microscopy Once the Wassermann reaction has become positive the prognosis is less favourable and the outlook for complete eradication is not so hopeful

As soon as a syphilitic infection has been diagnosed with certainty, penicillin therapy should be commenced without delay Where multiple daily injections of penicillin are practicable, for example in hospitals or in nursing homes, 60 000 units of aqueous sodium penicillin are given at 3 hourly intervals for 7½ days (60 injections—total 3,600 000 units) Many patients will, however, refuse hospital accommodation, and for these treatment with penicillin oil wax on an ambulant basis of one injection daily for 8 days has been designed The daily amount injected is 600,000 units (total 4,800 000 units) Penicillin urticaria occasionally develops after a few days It is treated with Benadryl, orally, in doses of 50 milligrams, three times daily

TABLE I

Treatment of ambulant cases in primary, secondary or early latent stages

Day	Procaine penicillin in oil with 2% aluminium stearate	Neoarsphenamine	Bismuth oxychloride
	Units	Gramme	Gramme
1st	300 000	—	—
2nd	300 000	0 3	—
3rd	300 000	—	—
4th	300 000	—	—
5th	300 000	—	0 2
6th	300 000	0 45	—
7th	300 000	—	—
8th	300 000	—	—
9th	—	0 45	—
12th	—	0 45	0 2
19th	—	0 6	0 2
4th week	—	0 6	0 2
5th week	—	0 6	0 2
6th week	—	0 6	0 2
7th week	—	0 6	0 2
8th week	—	0 6	0 2
Total	2 400 000	5 25	1 6

During this period of 8 days neoarsphenamine, 0 3 gramme, is given on the [illegible] 0 45 [illegible] the [illegible]th do[illegible] Thereaf[illegible] the [illegible]ame dose of 0 45

[illegible] oses

[illegible] 25

grammes is thus reached These amounts of neoarsphenamine are maximum and should be reduced for patients, usually women, whose weight is under 10 stone

(63 5 kilograms) For those of particularly light weight the individual maximum dose is calculated at the rate of 0 004 gramme per pound weight thus a person weighing only 7 stones 2 pounds should receive 0 4 gramme for the maximum dose

Very frequently a patient will have difficulty in arranging at short notice to attend daily for treatment Whilst arrangements are being made neoarsphenamine and bismuth injections should be given without delay By this means the progres sion of the infection from the sero negative to the sero positive phase may be prevented with the result that a substantial gain in prognosis may be obtained

On completion of the penicillin treatment bismuth oxychloride 0 2 gramme is administered each week at the same time as the neoarsphenamine for the next seven weeks

Treatment of Chancres

Local treatment for a small clean chancre is rarely needed When a large septic chancre is present or an accompanying balanitis is evident daily bathing of the genitals with hydrogen peroxide is advisable subsequently penicillin cream

of the vaccine of the streptobacillus (Dmelcos)

Under this schedule of combined treatment the lesions of the primary and secon

in the titre of the Wassermann reaction to a negative result in the third or fourth month from the commencement of treatment The persistence of a strongly positive Wassermann reaction up to the sixth month portends a relapse of the infection and additional treatment with a sim lar course of the three anti syphilitic remedies is necessary The Wassermann reaction should be done at monthly intervals so that any rise in titre of the reaction may be observed This rise should be interpreted as portending a relapse and re treatment is advisable

Incomplete Cure

In some obstinate cases the serological tests remain strongly positive in spite of two courses of the combined therapy Since some of these persistently positive cases are found to have asymptomatic neurosyphilis it is advisable to examine the cerebrospinal fluid after the failure of two courses of treatment before additional treatment is contemplated When the cerebrospinal fluid is found to be normal further courses of the combined penicillin neoarsphenamine and bismuth therapy should be given up to 12 months from the commencement of treatment It is

advisable in these additional courses to prolong the daily penicillin therapy from 8 days to 15 days and to follow with the usual amounts of neoarsphenamine and bismuth An interval of at least 8 weeks should elapse between these additional courses on account of the slow prolonged excretion of the arsenic In those cases in which the Lange reaction is of the paretic type a combination of malarial and penicillin therapy is advised

Tests of cure

All patients with early syphilis who appear to have been successfully treated should be kept under clinical and serological observation at regular intervals for a period of 3 years Serological tests should be carried out at monthly intervals for the first 3 months at 3 monthly intervals for the next year and thereafter at 6 monthly intervals The cerebrospinal fluid should be examined during the first year after treatment The patient may be considered free from infection if at the end of the 3 years' observation period all clinical and serological observations show no evidence of the disease

PREGNANCY AND SYPHILIS

The treatment of a pregnant woman suffering from syphilis calls for special consideration Usually the patient is a young adult whose toleration for the arsenicals and bismuth is good A combined course of penicillin neoarsphenamine and bismuth as laid down for early syphilis should be commenced as soon as possible The question of treatment rarely arises before the third month of pregnancy so that the interval between the end of the course of treatment and the birth of the child is about three months If the Wassermann reaction is still strongly positive at one month after treatment a second course of penicillin alone to a total of 3 000 000 units is advised In many cases however, the syphilitic infection is not recognized until later in pregnancy and there is insufficient time before delivery to complete the full course of treatment Fortunately however, penicillin therapy alone even when not given until the later months of pregnancy, has given excellent results as regards the protection of the child from infection

LATE SYPHILIS

In elderly patients much harm to the general health may be caused by injudicious intensive treatment with arsenicals at a time when the complete eradication of syphilis is probably impossible In general treatment in this late stage should be mild in intensity and leisurely in pace and it should be prolonged

Latent syphilis

One of the common problems in the management of late syphilis is the tr
of so-called latent syphilis. The term latent is applied to those cases of syp
which repeatedly positive serological tests are obtained and in which no signs
disease can be detected by thorough clinical examination. The diagnosis of th
of latency is one that is arrived at by elimination and should not be accepted
out radiological examination of the heart and great vessels and tests of the cere
spinal fluid. The use of the term latent tends to give the physician and patie
feeling of false security. The future duration of this latent phase cannot be predic
All cases of tertiary syphilis can give a long history of latency, and the lat
syphilitic woman is a well known producer of syphilitic children.

For the patient in whom meticulous examination has failed to reveal any sign o
the infection other than the positive serological tests, the approach to treatmen
will depend upon an estimate of the duration of the infection. Sometimes the date
of infection is known, but more commonly there is a complete absence of history
of infection. When it is known or estimated that the infection has been present for
less than 10 years and if the patient is free from other diseases, the treatment should
be that laid down for the early case of syphilis but it should be preceded by treatment
with potassium iodide, 30 grains, daily, and by weekly injections of a bismuth
preparation for one month. In the pregnant woman, however, no time should be
wasted on preliminary treatment but full treatment as for early syphilis should be
commenced without delay. The positive serological tests are usually reversed very
slowly by treatment and the course of treatment may have to be repeated 2 or 3
times.

Syphilis of the skin and mucous membranes

In the benign lesions of the tertiary stage, commonly occurring after the age of 50,
in which only the skeletal structures—skin, mucous membranes or bones—are
affected, there is little danger to the general health of the patient, although over a
long period of time the extent of local tissue destruction may be considerable.
Fortunately, even in the aged patient, the tertiary ulcerations of the skin and mucous
membranes respond remarkably speedily to mild treatment. Resolution can be
effected with potassium iodide, 30–60 grains, daily, together with a bismuth prepara-
tion in weekly doses of 0.1 gramme. Penicillin is also effective. Cutaneous ulcers
heal rapidly when 250,000 units in oil wax are given as infrequently as once a week.
or patients over the age of 60 such treatment for 4–8 weeks is often all that is
cessary. The positive serological tests will remain unaffected as they will be by
y form of treatment at this age.

n the younger age group of 50–60 years more extensive treatment is advisable
order to prevent the affection of vital structures such as the aorta or central
ous system. When the general condition of the patient is good a daily injection
0,000 units of procaine penicillin is given for 8 days. This should be preceded
eliminary treatment with potassium iodide and bismuth for 4 weeks. The
llin therapy is followed by a course of 8 injections of neoarsphenamine given
week in doses of 0.45–0.6 gramme and continued with a course of 8 weekly
ns of 0.2 gramme of bismuth. When the general health is not good, the

neoarsphenamine may be replaced by Acetylarsan in doses of 3 millilitres once weekly for 10 weeks

Syphilitic disease of bone

Syphilitic disease of bone is considerably more difficult to deal with than that of the skin When a nodular cutaneous syphilide is situated over a superficially placed bone, such as the tibia, sternum or bones of the skull, an underlying periostitis is frequently present This local periostitis responds to treatment less speedily than the overlying ulceration Although the symptomatic relief may be obtained in a few weeks, it may need several months of treatment before the bone disease is arrested Isolated disease of bone is also slow to respond to treatment and in syphilitic disease of bone it seems that the duration of treatment is more important than its intensity The few reports available of the value of penicillin in syphilitic osteomyel itis show, as with the arsenicals and bismuth that symptomatic relief may be prompt but ultimate resolution is very slow

Syphilitic Aneurysm

As an example of the treatment for late syphilis the following plan is advised for patients with syphilitic aortic regurgitation or aneurysm without heart disease

TABLE II

First year

Day	Dose	Treatment	
1st	75 000	Units of procaine penicillin in oil with aluminium stearate	Potassium iodide 10 gr three times daily is given during this period
3rd	100 000		
5th	150 000		
7th	200 000		
9th	300 000		
11th	300 000		
13th	300 000		
17th	300 000		
21st	300 000		
25th	300 000		
28th	300 000		
Weeks			
5th 10th	*0 1 g*	bismuth oxychloride, each week by intramuscular injection	
11th	1 ml	Acetylarsan by intramuscular injection	
12th	2 ml		
13th 18th	3 ml		
19th 20th	300 000 units	procaine penicillin-oil-aluminium stearate on alternate days	
21st 27th			
28th 35th			
36th–43rd			
44th 51st			

ASYMPTOMATIC NEUROSYPHILIS

... latent and tert ary stages—

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... and

tertiary cases O Leary and his colleagues (1937) found abnormalities in 12 per

cent of those with no signs of neurosyphilis Their extensive analysis of thes late cases reveals that between the tenth and twentieth year of the infection th proportion of cases of manifest neurosyphilis increases, whereas that of asympto matic neurosyphilis decreases It is strongly suggested by this and other studies that asymptomatic neurosyphilis forms the reservoir underlying the later supply of parenchymatous neurosyphilitic disorders such as tabes dorsalis and general paralysis of the insane, also, that abnormalities of the fluid typical of tabes dorsalis and general paralysis precede, and may precede by many years, the onset of the manifest disease The incidence of asymptomatic neurosyphilis in cases of cardiovascular syphilis, of late cutaneous or osseous syphilis and of latent syphilis is much the same No variety of late syphilis seems to be exempt The intensity of these abnormalities varies to a great extent with the duration of the infection

The various combinations of the abnormalities occurring in the fluid have been classified by Moore (1944) into three main groups

Group 1 —Slight increases in the number of lymphocytes, globulin normal or slightly increased, and Wassermann and Lange tests negative

Group 2 —Lymphocytes under 30, globulin increased, Wassermann weakly positive or positive and Lange weakly positive

Group 3 —High lymphocyte count, marked increase in globulin, Wassermann strongly positive, and Lange positive and of the paretic type

For patients exhibiting the changes portrayed in Groups 1 and 2 [illegible] ment with penicillin, arsenicals and bism [illegible] at- Several courses of treatm [illegible] d the changes in t [illegible] n paralysis is likel [illegible] il menced at once [illegible] Further treatmen [illegible] heals after malarial therapy [illegible] as soon as possible. [illegible] is desirable

Congenital Syphilis

The freedom of penicillin from toxic effects and its rapid healing effect on the ictive syphilitic lesions of infancy renders it a most valuable remedy for the initia- ion of specific treatment especially of the premature and of the marasmic infant he immediate effects of penicillin therapy are excellent The general condition nproves rapidly Cutaneous and mucous membrane lesions heal rapidly and the seous lesions undergo complete resolution in 3–4 months

nical Note

n many cases of congenital infection the infant appears normal until syphilitic ons betray the infection between the second and fifth month Treatment should nstituted immediately The problem of whether or not to give treatment to the irently healthy infant born of a known syphilitic mother requires some con- ation A positive serological reaction in the cord blood is by no means proof fection in the newborn infant It may merely reflect the serological condition e mother's blood Radiological examination for epiphysitis or periostitis of the bones is a most valuable method of determining the presence of infection In

months In such a case the infant should not receive treatment but should have repeated clinical and serological tests for at least six months A persistently strong positive reaction in the infant's blood or an increase in the intensity of an originally weakly positive reaction should be interpreted as indicating infection and the infant should then receive treatment In the event of the known syphilitic mother s

often difficult A more generally practical method, suitable for infants of any age, is to make two stab incisions into the skin of the side of the heel with a surgical

Penicillin Therapy

Penicillin is given by intramuscular injection at 4 hourly intervals in the young infant in whom on account of the slow renal clearance, the blood level of penicillin

preparations are not suitable for repeated injection into the infant s buttocks, but in older children the daily injection of procaine penicillin with aluminium stearate in daily doses of 100 000–200 000 units is advisable

When there is any delay or difficulty in arranging for the course of multip e in jections, treatment may be commenced with the oral administration of penicillin This is given at the rate of 10,000 units for each pound of the infant s weight, in each 4-hourly feed for 7–14 days

Arsenical and bismuth compounds

The penicillin therapy should be followed by weekly injections of an arsenical and of bismuth, both of which are well tolerated by children Since intravenous in jection is difficult in children under the age of 6 years reliance is placed upon sulpharsphenamine given by intramuscular injection It may be given to an infant a few weeks old in doses of 0 005 gramme, increasing each week by graduated amounts to 0 05 gramme at the end of a course of 8 weekly injections This is followed by intramuscular injection of a metallic bismuth suspension (0 02 gramme) each week for 8 weeks

When the injection of sulpharsphenamine causes local irritation or swelling in the buttock of the infant, Acetylarsan may be injected instead at the ratio of 1 millilitre for an infant weighing 15 pounds

per week between the fourth and eighth weeks Bismuth is given in amounts equivalent to 0 04 gramme of bismuth metal each week

Children affected with congenital syphilis are frequently debilitated and underweight The amounts of the arsenical and bismuth remedies should therefore be considered in terms of weight rather than of age In general, after the age of 3 months 0 005 gramme of sulpharsphenamine may be given for each pound of the child s weight as the maximum weekly amount in a series of injections Thus, for a

periodic clinical and serological observation until after puberty The cerebrospinal fluid should be examined in all cases with a persistently positive serological test after 2 courses of treatment

In many cases of infection, infancy and early childhood are passed in good health Later, usually between the sixth year and puberty, but sometimes in adolescence, isolated lesions such as interstitial keratitis, periostitis, gummatous ulceration or nerve deafness may develop Treatment is carried out along the lines indicated but repeated courses may be found necessary over several years to effect cure Interstitial keratitis responds very slowly Incomplete nerve deafness may be arrested but is rarely improved by treatment

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[illegible]

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SYPHILIS OF THE LIVER

(*See also* Liver Diseases)

Tertiary syphilis of the liver if not of long duration or if not very extensive responds well to specific treatment In many cases, however, when the gummatous process has been slowly developing for some years before it is recognized, the response to treatment is slow and full resolution is unlikely to be attained When only a few gummas are present and limited to one lobe of the liver the prognosis with treatment is good but when many large gummas are present and the process of contraction and distortion of the liver has already begun there will be some

gradual improvement with treatment When ascites is present a temporary improvement may be noted but, more often, treatment is of no avail

In syphilis of the liver there is a natural tendency towards resolution with fibrosis and contraction of the liver tissues to the detriment of the hepatic lobules Since this tendency is accelerated by specific therapy such treatment should be very mild and prolonged Iodide therapy will give relief from pain and tenderness in a few weeks and for the first 2–3 weeks potassium iodide only in doses of 10 grains

0 1 gramme once a fortnight, should be maintained over a 6 month period The use of the arsphenamines is not advised Enlargement of the spleen and of the testes respond readily to treatment, the testes after resolution are usually functionless and atrophied

V E LLOYD

VITAMIN DEFICIENCIES

BERI-BERI

TERMINOLOGY

Beri beri is a term which has been applied for centuries to a disease occurring predominantly, though by no means exclusively, among rice-eating peoples In several oriental languages there are words from which the term might have been derived, they are descriptive of some of the manifestations of the disease, such as weakness, swelling, altered gait or shortness of breath In countries in which the disease is endemic there are also descriptive vernacular terms In China, where it has been described in writings since 2697 B C, the term in general use, "Chiao Ch'i" (possibly the origin of the term kakke) was introduced in A D 265, it implies a disorder characteristic of the feet

AETIOLOGY

Beri beri is now recognized to be a nutritional deficiency disease which develops when the amount of vitamin B_1 in the tissue cells is insufficient for the maintenance of their proper functions Vitamin B_1, sometimes called aneurine or thiamine, is phosphorylated in the body to form the co-enzyme co-carboxylase, which is part of an enzyme system necessary for the metabolism of the pyruvic acid formed at a stage in the breakdown of carbohydrates Whilst pyruvic acid has been shown to accumulate in the body in some forms of beri-beri, the manifestations of the disease [illegible]

lesion may or may not be completely restored

Vitamin B_1 is an essential food factor, that is to say, it must be supplied to the body as part of the diet, except possibly for a small amount derived from bacterial synthesis in the gut An estimate of the size of a dietary deficiency can only be obtained when both the amount available in the diet and the body s needs are known Several factors influence the individual's requirement for vitamin B_1 they include pregnancy, lactation heavy muscular work, pyrexia and hyperthyroidism, and probably also inability to rest after work and high environmental temperature and humidity All these factors affect the level of metabolic activity in the body Vitamin B_1 requirement can therefore be related to the energy value of the diet but, since it is not required for the intermediate metabolism of fats, it should be related to the non fat calories rather than to the total number Other differences in dietary pattern may also affect the amount of vitamin B_1 which must be supplied in the diet for adequate nutrition

Insufficiency of vitamin B_1 in the tissues may also arise from impaired absorption, for example, the vitamin may be destroyed in the stomach of an achlorhydric subject, there may be excessive loss from the bowel in diarrhoea, or interference

with bacterial synthesis may occur following the administration of intestinal anti

co carboxylase, the concentration of the phosphorylated form may be raised however, by increasing the supply to the body of vitamin B_1 *The administration of* a pyridine analogue of ypovita minosis B_1, which can nin The possibility of naturally -vitamin effect should not be overlooked

The manifestations in man of hypovitaminosis B_1 are not infrequently accom panied by evidence of insufficiency of other food factors, so much so that a form of pellagroid beri beri is described, and, in the days of sailing ships, ship beri beri and ship scurvy apparently occurred in the same subject Indeed, in the opinion of eminent authorities on the disease, *it is still an open question as to whether* deficiency of vitamin A and of members of the B_2 group of vitamins may not contri bute to the degeneration of the nerves seen in dry beri beri

CLINICAL NOTE

Nearly a third of a large sample of an urban population in which beri beri is endemic showed minor signs of vitamin B_1 deficiency (Annual Report of the Henry Lester Institute of Medical Research, 1937–38), these included listlessness and early fatigue during muscular effort, evidence of peripheral neuropathy affecting the limbs or muscle groups most used in work, and oedema of the lower

ting beri beri (shöshin) characterized by intense sustained dyspnoea, restlessness, signs of heart failure and a *fatal termination hours after the onset of the acute* phase unless promptly treated The majority of patients were, however, of a sub-acute mixed type, with neuropathy, oedema and involvement of the heart and circulation in some the presenting signs were of the neuropathy, in others the

th more or less extensive oedema predominated

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ever, of the close resemblance between the forms in which hypovitaminosis B_1

due to hypovitaminosis B_1, is not a complication of oriental beri beri, except possibly in breast fed infants, though cases have been reported among prisoners of war in the Far East

The term secondary beri beri has been applied to the disease when it occurs as a complication of diseases such as chronic alcoholism and in conditions in which there is achlorhydria In view, however, of the variety of factors which contribute to the emergence of the disease, a clear separation into primary and secondary

beri beri presents many difficulties, even in one half of 100 cases of subacute endemic disease, the presenting symptoms developed after various febrile illnesses

TREATMENT

Acute Fulminating Beri beri

Before isolated natural or synthetic vitamin B_1 became available, patients with acute fulminating beri beri invariably died, usually within a day or two after the onset of the acute phase of the disease Provided the patient has still 3 or 4 hours of life left, there is, in the uncomplicated case a most dramatic response to the intra- [illegible]

pressure rises and the heart rate falls to normal (sometimes with occasional periods of bradycardia) In 2 or 3 days there may be a remarkable diuresis Some weeks may elapse, however, before the heart returns to its normal size Signs of peripheral neuropathy are not prominent and their response to treatment depends on the length of time they existed before the onset of the acute phase of the disease Removal of 8–10 ounces of blood by venesection may be of benefit if the signs of heart failure are extreme, intracardiac injection of adrenaline has been employed successfully on cessation of the heart beat during treatment and should be accompanied by the administration of additional vitamin B_1

The subjects who die in the early hours of treatment generally have marked hypoglycaemia, and hypoglycaemic convulsions have been observed as a terminal event Intravenous glucose with vitamin B_1 might be worth trying in these circumstances No benefit is derived from the employment of other drugs including diuretics and cardiac stimulants A rise of the pulse rate in a resting patient may be taken as an indication of insufficient dosage with the vitamin this rise may be accompanied by pyrexia or may be due to the consumption, with returning appetite,

exercise taken too soon may be followed not only by the usual evidences of a slow return of the pulse rate to normal but also by a temporary return of some of the symptoms of the acute disease and a rise in blood pyruvate level which only slowly returns to normal

Dry Beri beri

By contrast, the results of treatment of the dry, atrophic type of beri beri are meagre The patient s activity and his total food intake may both have been so much reduced that his diet may be in nutritional balance at this low level The results of specific vitamin therapy are consistently disappointing Physiotherapeutic measures are indicated and only a slow and small response can be expected

Mixed Type of Beri beri

Cases of the mixed type of beri beri respond well to rest in bed This treatment may be supplemented by specific vitamin therapy and should always be

accompanied by the *feeding of a nutritious diet in view of the* possible complication by deficiencies of other dietary essentials (*see* page 993) The bedclothes should be

ment can be applied to the affected muscles when the pain has subsided

INFANTILE BERI BERI

Infantile beri-beri, if not too far advanced, responds to an injection of vitamin B_1 *as dramatically as does the acute fulminating disease of adults* It would appear to be desirable to return the infant to the breast after treatment of the mother for

BERI-BERI HEART AND NUTRITIONAL PERIPHERAL NEUROPATHY

For the treatment of beri beri heart and nutritional peripheral neuropathy, American authorities recommend the administration of much larger doses of than have been found necessary for the treatment of oriental beri beri

laimed,

ppear in

24–36 hours, and oedema is reduced or absent in 24–48 hours Loss of power and the more refractory nervous changes are said to respond only after 2 or 3 months of continuous administration of the vitamin Only some of the manifestations of Wernicke's encephalopathy are reported to yield to vitamin B_1 therapy

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amount

in the human body has been estimated as being about 25 milligrams, and the body's capacity for storing this vitamin is small Furthermore, evidence is accumulating *that, after a specific defect is remedied, it is desirable to obtain the nutrient as part* of a good mixed diet

Special measures have to be taken to prevent loss or destruction when these are excessive and when, as in tissue *anoxia, a relative increase in the amount of vitamin* B_1 is indicated Occasionally, undesirable side effects following the administration of vitamin preparations have been reported in some cases these are attributed to impurities Occasional subjects are intolerant of vitamin B_1 even when it is given in moderate dosage The symptoms of intolerance are loss of appetite, nausea and malaise

PROPHYLAXIS AND AFTER-TREATMENT

The basis of the prevention of the occurence and recurrence of beri-beri is for the individual to be able to obtain sufficient vitamin B_1 for his needs from the foods eaten, allowing for increased needs under various stresses and in certain diseases In the absence of such conditioning factors, an ample allowance is 1 5 milligrams for an adult daily A borderline supply is 0 3 milligram per 1,000 non-fat Calories

(approximately 0 75 milligram in a low fat 2,500 Calorie diet) and at a level of 0 2 milligram per 1,000 (0 5 milligram in the 2,500 Calorie diet) beri beri is to be expected

Most foods eaten by man contain more than enough vitamin B_1 for their metabolism Fats and oils do not contain this vitamin, but do not require its presence in their intermediate metabolism Highly refined cereals and certain starchy foods such as cassava do not contain sufficient vitamin B_1 to provide for [illegible]

TABLE

VITAMIN B_1 VALUE OF VARIOUS FOODS

Food	Milligrams vitamin B_1 per 1,000 Calories
Cereals, lightly milled	0 9
Cereals highly milled	0 2
Starchy roots (except cassava)	1 0
Cassava	0 1
Pulses, peas and beans	2 8
Beef	0 5
Pork	2 0
Liver and kidney	2 2
Milk	0 7
Egg yolk	0 9
Walnuts	0 6
Cobnuts	0 6
Dark green leaves	3 4
Sugars	0
Fats and oils	0

(Values for the amount of vitamin B_1 per 1 000 *non-fat* Calories for egg yolk walnuts and cobnuts are 4 7 4 3 and 3 5 milligrams respectively)

From the Table it can be seen that beri beri is likely to develop only when the diet contains a preponderance of highly milled cereal, cassava or similar products, or a very high proportion of refined sugar The measures needed for its prevention are an increase in the proportion of foods of good vitamin B_1 content, the retention of the vitamin in the processed cereals, or addition of the vitamin to refined foods or to foods in which it does not naturally occur These measures may be taken singly or together according to local circumstances

VITAMIN B_1 PRESENT IN DIET IN UNITED KINGDOM AND UNITED STATES OF AMERICA

The amount of vitamin B_1 in the dietary of the United Kingdom rose from a pre-war average of 1 17 milligrams per head per day to 1 92 milligrams (1943 level) as a result of the scientific food policy adopted during World War II Ninety per cent

of this increase was due to the raised extraction rate of wheat flour (85 per cen
extraction wheat flour contains 0 3 milligram and 70 per cent extraction whit
[illegible]

Over the same period, the amount of vitamin B_1 in the dietary of the Unite
States of America has risen from 1 77 to 2 49 (1943 level) milligrams per head pe
day Of this increase, 62 per cent is attributable to the policy of fortifying refine
cereals with synthetic vitamin B_1, the remainder is due to a decrease in the consump
tion of sugars and fats and to an increase in the consumption of foods of goo
vitamin B_1 content

In neither of these countries is the dependence on cereal foods anything like s
high as may be found in the areas where beri beri is endemic In the United State
cereals provide less than 30 per cent of the total calories, in the United Kingdon
the proportion rose to 37 per cent during World War II in many other parts of th
world dependence on the staple food is so great that it accounts for between 80 an
90 per cent of the total calorie intake In these areas an increased consumption o
other foods is difficult to attain because they are in short supply, they are dear
and the people are poor Attention must therefore be given, primarily, to the stapl
food In populations where beri beri is endemic the staple food is usually rice

RICE

Lightly milled rice has a vitamin B_1 content of 0 7 milligram per 1,000 non fa
Calories compared with only 0 18 milligram per 1,000 in the highly milled product

In a typical 2,500-Calorie diet with rice as the staple food, some 2,000 Calories o
more are provided by the rice The remaining 500 Calories, drawn from a variety o
different foods including whatever oil or sugar is available, are unlikely to carry
with them more than 0 4 milligram of vitamin B_1 The rice itself must therefore
provide at least 0 5 milligram if the danger of beri beri is to be avoided Highly
milled rice does not provide this amount

When higher calorie requirements have to be met, for example, those of labourers
utilizing 3,500 or 4,000 Calories daily, it is usual to meet these additional needs by
increasing the consumption of rice The consumption of the other foods is rarely
increased in proportion As a result, dependence on the rice for the provision of the
requisite amount of vitamin B_1 becomes even more marked and, if it is highly

rice is lightly milled, parboiled or "fortified'

PRACTICAL ASPECTS

In practice it is necessary to provide a diet containing a supply of vitamin B_1 well
above the level at which beri beri is just prevented, for this vitamin is water soluble
and a very considerable proportion (50 per cent or more) is frequently lost in wash
ing and cooking. Most of this loss could be avoided, and special attention should
be paid, in hospitals prisons and in other institutions, to the conservation of the
vitamin during preparation of the food

B S PLATT

Annual Report of the Henry Lester Institute of Medical Research (1937–38) Shanghai, N C D N
Platt, B S, and Gin S Y (1934) *Trans Far East Ass trop Med*, 2, 407

PELLAGRA

DEFINITION

Pellagra is a dietary deficiency disease It may be regarded as due to a deficiency of niacin (nicotinic acid), one of the members of the vitamin B complex Experimental evidence indicates that the amount of niacin required is dependent on the amount of tryptophan in the diet and the possible presence of unidentified toxic factors or antagonists in maize

HISTORY AND GEOGRAPHICAL DISTRIBUTION

The disease was first observed in 1735 by Gaspar Casal in the vicinity of Oviedo, Spain The name pellagra is Italian in origin and was first used in medical literature by Francesco Frapolli of Milan in 1771 The carefully conducted studies of Goldberger, beginning in 1914, proved the dietary deficiency nature of the disease, and Elvehjem in 1937 discovered that niacin was the vitamin concerned

The disease is especially prevalent in those areas of the world where maize is the

holism, and similar conditions The use of maize is not essential

CLINICAL NOTE

The clinical characteristics of pellagra are stomatitis, dermatitis and gastrointestinal disturbances The disease usually begins with weakness, loss of weight, and indigestion followed by a burning sensation in the mouth ulcerative stomatitis and an acute dermatitis The dermatitis is frequently bilaterally symmetrical in distribution and usually is found on the forearms, hands, feet, legs, face, neck and genitalia Mental depression is common, in a few cases, the mental and nervous changes may be serious

The symptoms of pellagra usually are found in association with the symptoms of

COMPLICATIONS

Severe secondary infection may occasionally occur in the skin lesions, especially the moist, bullous type Pigmentation is common in the skin lesions and may persist for many years Skin atrophy may occur if the dermatitis has been severe

The dementia commonly mentioned in pellagra is actually quite rare in American experience Cases are found in the insane because of feeding problems Many cases are complicated by conditions such as parasitic diseases, chronic infections,

cirrhosis of the liver, and so forth Such conditions must be adequately treated if good therapeutic results are to be anticipated

TREATMENT

Curative

The first essential is to supply enough niacin to cause a rapid recession of the more serious and distressing symptoms If the case is seen in the early stages, the oral administration of 100 milligrams of niacin amide 3 times a day is sufficient Seriously ill patients may require a total daily dose of 600 milligrams or more intravenously Cases with encephalopathy have been treated with doses up to 1,500 milligrams daily, given intravenously in saline solution

The niacin amide is to be preferred to niacin itself since in these therapeutic doses it is much less likely to produce a reaction, which though harmless may unnecessarily disturb the patient The reaction is simply a temporary flushing with a sensation of warmth which subsides within an hour Abdominal pain occasionally occurs also

The second essential in treatment is to supply other nutrients in quantities sufficient to restore the depleted individual This objective must be pursued vigorously and is difficult to attain because of anorexia A variety of methods should be used Crude liver extracts for oral use should be given in liberal doses Dry yeast, in doses of ½–1 ounce, may be used 3 or more times a day This should be given mixed with milk, non alcoholic egg nog or in cooked cereal Wheat germ also may be used in daily amounts of 150–300 [illegible]

considerably larger than maintenance amounts, and small frequent dosing is to be preferred to one large dose Desirable amounts per day would total for thiamine 10–30 milligrams, for riboflavine 5–15 milligrams, ascorbic acid 100–300 milligrams, and vitamin A 25,000–50,000 i u

A very important part of the treatment is the consumption of a satisfactory diet [illegible]

liquid diets of low calorie and nutrient value Milk should be used very freely both as part of the meal and between meals in any way that will appeal to the patient Eggs may be added to the milk Beef juice, meat soups, lean meats, fish, poultry and liver are important foods and the vegetables used should be largely of the green leafy and yellow varieties

Remedial

If the above therapeutic measures are followed faithfully, the uncomplicated case of pellagra will recover rapidly The only other treatment necessary is local and symptomatic The skin should be protected from the sun and irritants of all kinds

... or soothing ointment may be used Care should

... te

... be

... sa-

tion, the superficial ulceration and ... th-

wash may be indicated

... besides under the vitamin and diet therapy If not, the

... dration is

severe If used, thiamine, riboflavine and ... lution

... symptoms may necessitate institutional

AFTER-TREATMENT

This depends on control of the factors which precipitated the onset of the disease If the basic trouble is increased demand for or failure to absorb and utilize niacin ... must be directed to the elimination or control of the ... chronic alcoholism, cirrhosis of the liver, ... intestinal tract, and so forth, every effort ... In addition, continued administration of ... urrence

...

advised to eat a diet containing ... green vegetables It must be remembered that such advice is frequently without value if the individual has no means of obtaining such foods regularly

PREVENTIVE

... and food are available, preventive treatment consists in attention to the ... lean meat, milk, eggs and leafy ... value In unusual cases ... which the normal diet cannot be obtained, the continued use of ... about 20 milligrams of niacin is indicated as a preventive measure

In endemic pellagra areas where large numbers of people cannot obtain the foods necessary for the prevention of pellagra, two methods of prevention are being attempted In the United States of America, niacin, riboflavine, thiamine and ... to wheat flour and to white bread The expense ... of people and no continued education ... The second approach to prevention is to introduce new foods such as food yeast Such dietary changes usually encounter serious difficulty through interference with food habits, economic factors, and so forth In any case, in rural areas, agricultural practices which will produce the

necessary preventive foods should be encouraged and supported Education in the use of such foods is essential

W H. SERRELL

SCURVY (DEFICIENCY OF VITAMIN C)

HEALTH REQUIREMENTS

The amount of vitamin C which is necessary to preserve health has been much disputed The figure put forward by the League of Nations Health Committee was *30 milligrams of ascorbic acid, this amount is not sufficient to keep the body* "saturated" with ascorbic acid by the test devised by Harris and Abbasey (1937) [illegible]

amount is taken symptoms of scurvy slowly develop, but it can be cured in 3 weeks if the dose of ascorbic acid is raised to 20 milligrams

THE COOKING OF FRUIT AND VEGETABLES

Anyone who takes a mixed diet containing fresh or tinned fruit and vegetables should not develop any symptoms of scurvy, provided that the fruit and vegetables have been cooked properly Ascorbic acid is destroyed by an oxidase which is [illegible]

are kept hot for some time before serving The amounts of ascorbic acid in milli grams which are contained in 3½ ounces are given in the following tables, and they show how easy it is to prevent scurvy

	Mg Ascorbic Acid per 100 g (3½ oz)		Mg Ascorbic Acid per 100 g (3½ oz)
FRUITS (Raw)			
Apple Blenheim Orange	3	Lime	32 58
,, Bramley Seedling	16	Loganberry	20–48
,, Cox's Orange Pippin	2	Melon, Cantaloupe	15–53
Banana	1–15	Orange	16–99
Cherry	3–17	,, juice	28–89
Currant (Black)	136–353	Pear	1–10
Currant (Red)	50	Peppers	12 330
Gooseberry	28–47	Pineapple	10–63
Grape	1–4	Plum	0 5–5
Grape-fruit	26–65	Raspberry	30
Greengage	0 5–7	Strawberry	46–77
Haw	49–500	Tangerine	10–36
Hip	10 1870(a)	Tomato	13 39
Lemon	14–66		

FRUITS (cooked)			
Currant (black)	90 } as normally eaten (d)	Hip	210 (cooked 12 mins, sieved sugar added, cooked another 4 minutes)
Currant (red)	23 } as normally eaten (d)		
Gooseberry	20 } as normally eaten (d)		
Grape-fruit	34–50 (canned)	Loganberry	20 (as normally eaten)
		Orange	29–50 (canned)
		Strawberry	10–55

VEGETABLES (Raw) used as salads	Mg Ascorbic Acid per 100 g (3½ oz)		Mg Ascorbic Acid per 100 g (3½ oz)
Carrot	4	Kohl rabi	50
Celery	1–6	Onion spring	14
Cucumber	1 18	Radish	12 20
Endive	19	Tomato	13–39
Lettuce	0 5 22(b)	Watercress	24–76
Cabbage	20–124	Sprouts	72–146
Cauliflower	19–101	Swede	20–47
Green sprouting broccoli	111 141(c)	Turnip	17–43

VEGETABLES (Cooked)			
Asparagus (green stem) solid	19–40 (boiled) 13–33 (canned)	Potato solid	4–15 (boiled peeled) 4–17 (steamed peeled)
Beetroot	20 (boiled 1 2 hours)		7 (fall from 10 after two hours in hay box)
Beet tops	16 (boiled 10 minutes	Spinach	30 (boiled 30–40 minutes)
Broccoli	22 (boiled)	Sprouts	33–44 (boiled 30–40 minutes)
Cabbage	10–22 (boiled 30 minutes)	Tomatoes	7 21 (canned)
Kale	36 (boiled 25 minutes) 20 (boiled and then kept hot in hay box)	Tomato juice	5 4–23
		Turnip	18 (boiled)

[illegible]

TREATMENT

Preventive

Whereas the accepted health requirement of vitamin C is 20 milligrams a day, some healthy persons seem to need more than this amount Furthermore it is probable that any infection increases the need for vitamin C just as it does for insulin Consequently it is important to make certain that ill people take extra amounts of ascorbic acid say 50–100 milligrams a day

Curative

If a patient has any symptoms of scurvy it is wise to give large amounts of vitamin C This is best done by giving ascorbic acid itself by mouth provided that the patient has not got any disease of the gastro intestinal tract which prevents absorption If so, the ascorbic acid should be given intramuscularly A dose of 5 000 milligrams will saturate the patient and ensure the presence of ascorbic acid in the plasma and restore the patient to health as quickly as possible It can all be given in 1 day or spread over 5 days It is also important to give sufficient fresh fruit juice to supply 100 milligrams of ascorbic acid a day and this will provide the necessary vitamin P which may also be lacking If extensive haemorrhages have occurred into the subcutaneous tissues adhesion to the muscles may develop This will require massage radiant heat and possibly gentle traction with an

"extension" apparatus if contraction of the hamstrings has occurred in a long standing untreated case

PRE-OPERATIVE

If the patient is about to undergo an operation and especially an abdominal one, an inquiry should always be made into the diet, and the method of cooking the

[illegible]

the gastro-intestinal tract is satisfactory If not, it must be given intramuscularly

DEFICIENCY OF VITAMIN P

It has been shown that vitamin P or Hesperidin, first described by Szent-Györgyi may also be lacking This vitamin has been shown to be concerned with the permeability of the capillary wall, as shown by the tourniquet test (Scarborough, 1940) A positive pressure of 70 millimetres of mercury maintained for 7½ or 15 minutes does not produce any petechial haemorrhages in healthy people, but patients with scurvy usually, but not invariably, give a strongly positive test If vitamin P is administered and the ascorbic acid withheld for a few days, the tourniquet test becomes negative although the symptoms of scurvy are unaltered Some patients who have not got scurvy and may even be saturated with ascorbic acid, develop petechial haemorrhages and have a positive tourniquet test If these patients are treated with vitamin P the petechial haemorrhage disappears and the tourniquet test becomes normal

Vitamin P is present in many fruits alongside the ascorbic acid but not in parallel amounts Apples, blackberries, black currants, cherries, grapes, and limes are rich sources Thus grapes, apples and lettuce, which contain little ascorbic acid, are rich sources of vitamin P

The trade preparations are Permidin dose 150–300 milligrams, 3 times a day, and Rutin, 20–60 milligrams, 3 times a day

GEORGE GRAHAM

[illegible] (1937) [illegible] 21 330

[illegible] *search*, 4 593

X-RAY AND RADIUM THERAPY

RADIUM THERAPY

Some fifty years have elapsed since the discovery of radium and after experiencing all the vicissitudes usually encountered by a new and unusual therapeutic agent its place in medical treatment has now been firmly established

The use of a physical agent such as radium in the treatment of disease is based on certain biological and physical phenomena Within recent years much real progress has been made in elucidating the complex biological basis of radiotherapy but many fundamental problems still remain unsolved The labours of the physicists have however been amply rewarded and the physical basis of radiotherapy has been widely and successfully explored with the result that much of the past empiricism of radiotherapeutic treatment has been eliminated

In the following outline an attempt will be made to describe the principles and methods of radium therapy its indications and the care that patients receiving this form of treatment require

PHYSICS OF RADIUM

Radium possesses the property of radioactivity that is of spontaneously dis

trolled or altered and is very slow Nearly 1 700 years have to elapse before the radio activity from any given quantity of radium diminishes by half The radiations emitted are of three main types The *alpha* particle which is a positively charged atom of helium is the least penetrating of the three being absorbed by thin sheets of paper or a few centimetres of air The *beta* particle is an electron or unit of

beta particles

BIOLOGICAL EFFECTS OF RADIATION

Effects on Normal Tissues

All the rays emitted by radium produce similar effects on living matter since they have in common the property of producing ionization in the tissues or cells in which their energy is absorbed

Living matter when subjected to ionizing radiations undergoes progressive change ranging from arrest of growth and alteration of function to death The precise effect obtained depends on the dose of radiation the method of irradiation and the nature of the tissue or cell irradiated

Although there is no living tissue in the human body which cannot be destroyed if given sufficient radiation under ordinary conditions different tissues respond

differently to equal quantities of radiation Th
or organ is an inherent property of its com
an important part Thus tissues compo
undergoing freq ent d
Amon
poietic ti
the basal
salivary
other hand nerve cells and connective tissue cells are particularly radio resistant

EFFECTS ON PATHOLOGICAL TISSUES

Malignant tumours

Variations in radio sensitivity similar to those existing among normal tissues are also found among the malignant tumours to which these tissues may give origin Whilst the radio sensitivity of the different types of malignant cell corres ponds closely to tha of

radiation therapy

In general malignant tumours can be grouped according to radio-sensitivity as follows

Highly radio sensitive tumours arising from the lymphatic haemopoietic and reticulo-endothelial systems some testicular and some salivary gland tumours

Moderately radio-sensitive tumours arising from the epithelium of the skin or mucous membranes of the tongue mouth, throat and cervix uteri and the glandular epithelium of the breast

The bulk of the radio resistant tumours is formed by neoplasms arising from con nective and nerve tissue for example fibrosarcoma osteogenic sarcoma certain gliomas and malignant melanoma

Benign tumours

Radium radiations both *beta* and *gamma* are of value in the treatment of certain common be
from abnc
fibrous tiss
proliferation and bring about healing by preventing the replacement of the im mature abnormal tissue destroyed by the radiation Radiation is successful in radicating only certain varieties of the tumours mentioned

Inflammatory conditions

In the past both *beta* and *gamma* rays of radium have been widely used in the reatment of acute and chronic inflammation of both bacterial and non bacterial origin for instance tuberculosis of the skin and lymph nodes actinomycosis pyogenic infections eczema and psoriasis Nowadays x rays are used for prefer nce for technical and economic reasons

The mode of action of radiation in inflammatory conditions is not really known but is probably due to a combination of factors including inhibition of cell division

and activity, the destruction of lymphocytes with the liberation of antibodies and the production of hyperaemia

Disorders of function and miscellaneous conditions

There remains a rather varied group of conditions entering the fields of dermatology, gynaecology and endocrinology in which radiation is of definite therapeutic value

and rhythm, but extreme caution must be exercised in advising treatment for this purpose because of its possible effect on subsequent progeny At the menopause, cessation of the periods can be induced by sterilizing the patient by radiation

Cases of pituitary and thyroid dysfunction, for instance acromegaly and thyrotoxicosis, can occasionally be helped by radiotherapy

METHODS OF USING RADIUM

Of the three types of radiation emitted by radium, the *alpha* rays are absorbed in the horny layer of the skin and are therefore of little therapeutic value The fastest

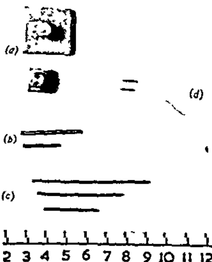


FIG 42—Radium apparatus (a) *Beta* ray

for removing the seed) The figures on the photograph represent centimetres

usually monel metal* containers of convenient size, shape and radium content (usually about 5 milligrams per square centimetre of radiating surface) A thin filter is used which stops the *alpha* radiation but permits the passage of *beta* and *gamma* rays In the short treatment times employed, although the tissue is exposed to this mixed *beta* and *gamma* radiation, the biological effect is almost entirely due to the energy absorbed from the [illegible]

W [illegible]

radia [illegible]

rays without *beta* rays Filtration through at least 0 6 millimetre of platinum is sufficient to absorb all the *alpha* and *beta* radiation and permit the passage only of *gamma* rays In clinical practice the *gamma* rays are the most important and most frequently used type of radiation

There are three main methods of using *gamma* rays therapeutically

(1) By external or surface application of radium in the form of an applicator or by means of a teleradium unit

(2) By implantation of radium needles or radon seeds into the tissues

(3) By intracavitary treatment, that is by inserting radium tubes into the lumen of a hollow organ

External or Surface Application

Radium applicators

Radium applicators or moulds (Fig 43) are used for treating lesions superficially placed on the skin or surface of an accessible mucous membrane such as that of the cheek or the floor of the mouth The materials used for making applicators of this



Fig 43 —Models illustrating the construction of an intra buccal radium applicator (*a*) Impression of the upper and lower jaws taken with dental trays using stent dental composition The tumour on the alveolus is indicated in black (*b*) Plaster of Paris models made from the stent impressions (*c*) Vulcanite denture made from the models The lower denture incorporates a lead lined box into which the radium is placed

type are numerous the most commonly used being dental impression compounds such as stent Elastoplast felt or various plastic materials The quantity of radium used is usually 20–50 milligrams in the form of radium tubes (Fig 39 (b)) and the

* Monel metal is a nickel-copper zinc alloy

radium is maintained at a short distance (usually 5–20 millimetres) from the tumour Treatment is given for several hours every day and the total treatment time is usually 5–8 days By distributing the radium on the surface of the applicator according to certain mathematical rules a homogeneous field of radiation can be obtained and dosage accurately recorded

Teleradium unit

[illegible] (Fig 44) [illegible]
rays

Treatment by teleradium is suitable for extensive bulky or deeply infiltrating tumours of the skin and for tumours in the head and neck region, such as the buccal cavity, tonsil fauces larynx pharynx and metastases in cervical lymph nodes

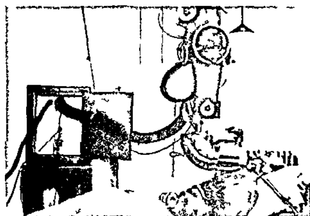


Fig 44 —Ten gramme teleradium unit (Royal Cancer Hospital) The apparatus is connected by means of a special flexible tube to the safe seen on the left The passage of the radium source between the apparatus and the safe is effected by pneumatic methods

Given sufficient radium there is theoretically no reason why teleradium should not be employed in the treatment of deeply placed and inaccessible lesions such as occur in the chest abdomen and pelvis but on physical technical and economic grounds x rays are commonly employed in these sites

Treatment by teleradium is usually given daily for 5–6 days every week and the course of treatment may last from 4 to 6 weeks

IMPLANTATION

Radium needles

The implantation of radium needles can be employed for tumours of the skin or accessible mucous membranes when owing to undue mobility or sensitivity of

the part, for instance the tongue, surface application cannot be tolerated (Fig 45) A very bulky tumour may also require implantation rather than surface treatment Not uncommonly surface application and implantation of needles are available as alternative methods of treatment When this is so, preference should be given to radium application rather than implantation since the former is non operative in



Fig 45 —Early carcinoma of the tongue (*a*) Skiagram showing radium needles in place, (*b*) before radium implantation (*c*) after treatment

character, less upsetting to the patient and allows of more accurate assessment of dosage

tumour bed, as for instance in tumours of the parotid gland

For implantation purposes the radium salt is contained in hollow, pointed needles made of iridioplatinum having an equivalent filtration of 0 5–0 8 millimetre of platinum The needles usually contain from 0 5–3 0 milligrams of radium (Fig 42 (c))

Radon seeds

[illegible]

Apart from their small size and relative cheapness, radon seeds differ from radium needles mainly in that radon gas is short lived After a month a seed may be regarded as inactive, and if left in the tissues remains as a harmless foreign body If for any reason it is undesirable to leave seeds permanently in the tissues, a thread



Fig 46—Skiagram showing radon seeds in the orbit of a child suffering from glioma of the retina



Fig 47—Skiagram of the intracavitary radium treatment of carcinoma of the cervix uteri A radium tube can be seen in the uterus and two small boxes containing radium in the vaginal vault

can be incorporated in the seed so that its removal from the tissues can be effected. Radon seeds may be used with advantage in the following circumstances

(1) As an alternative to radium tubes for surface application to small skin lesions.

(2) For small tumours of the buccal cavity in elderly patients The insertion of seeds is a very minor procedure and does not require hospitalization of the patient or a second anaesthetic for removal of the containers

(3) The small size of the seed makes it of value in the treatment of ocular tumours, in which site removal of the seeds is always indicated (Fig 46), or for

permanent implantation for treatment of tumours of the bladder oesophagus or stomach

INTRACAVITARY TREATMENT

Intracavitary treatment is really a special example of surface application of radium as the internal surface of a hollow organ is treated by placing radium in contact with it The classical example of this method is the treatment of cancer of the cervix uteri in which radium is inserted into the cervical and uterine canal after preliminary dilatation and small rubber covered silver boxes containing radium tubes are placed in the vault of the vagina in contact with and surrounding the projecting cervix (Fig 47) The oesophagus, rectum and vagina are other sites lending themselves to intracavitary treatment

Radium tubes containing 5–50 milligrams of radium filtered by at least 1 millimetre of platinum are employed in this form of treatment The treatment times and method of distributing the radium vary according to the site treated

DOSAGE

From the earliest days of radium therapy it has been customary to express dosage

various levels in the tissues The milligram hour system of dose measurement has now been completely replaced by expressing the dose in roentgens the roentgen (r) being the standard unit of measurement for both x rays and γ rays

It has been found that 8 3 r are delivered through the air at a distance of 1 centimetre from 1 milligram of radium contained in a point source with a filter of 0 5 millimetre of platinum

The actual dose given in any particular case depends on a variety of factors among which the tumour site and histological type the treatment method employed and the duration of the treatment are of prime importance It has been found for example that a large number of epithelial tumours can be made to disappear by giving doses of 5 000–6 000 r in a certain time but it must be emphasized that there is no standard cancer dose and each case has to be judged and treated on its own merits

By contrast with malignant disease the dosage employed in the treatment of non malignant conditions is usually low For non malignant tumours doses of the order of 500–1 000 r may be given and for inflammatory and other conditions doses of about 40–100 r are usually sufficient These treatments may be repeated on 3 or 4 occasions at varying intervals of time

PURPOSE OF RADIOTHERAPY

From the preceding account of the effects of radiation on patholog cal tissues it can be seen that radiotherapeutic treatment may be required for the following four main groups of lesions (1) malignant tumours (2) benign tumours (3) inflammatory processes and (4) disorders of function and miscellaneous conditions

The purpose of radiotherapy will clearly differ from group to group

MALIGNANT TUMOURS

In the treatment of malignant disease, radiation may be used as a curative or [illegible]

[illegible]

ber. They comprise cancers arising from accessible regions, namely the skin, lip, buccal cavity and cervix uteri There is reason to believe that cancer of the vocal cord and urinary bladder may now with justification be added to the group of radio-curable neoplasms The inaccessible cancers of the body cavities, namely intracranial, intrathoracic and intra-abdominal neoplasms, still, as a rule, defeat the radiotherapist Although recent technical improvements increase the salvage rate of this group, surgery remains the method that holds out the chief hope of cure for the patient

Curative treatment

[illegible]

pat [illegible]

nal [illegible]

course of treatment throws a heavy burden on the patient In many cases the treatment is long and tedious, accompanied by constitutional disturbances and considerable local discomfort, and it is not without risk of complications due to tissue damage Although severe reactions and other consequences and risks of treatment have to be accepted as part of the price to be paid by the patient for the chance of cure, it is important that the patient be given at the outset a full and clear picture of all that the treatment entails

Palliative treatment

Palliative treatment is given when a condition known to be ordinarily or occasionally suitable for radiotherapeutic treatment presents certain features which rule out any reasonable chance of cure These features depend on the following

The nature of the tumour.—(a) Tumours known to be of very limited radiosensitivity, such as fibrosarcoma and bone sarcoma, when alternative treatment is contra-indicated (b) Radio-sensitive but systemic disease when eradication is impossible, for instance leukaemias and Hodgkin's disease

The site of the tumour.—The tumour may be inaccessible—a deeply seated cancer It should be clearly understood that not all tumours occurring within the body cavities are unsuitable for curative radiation treatment In certain tumours, such as carcinoma of the oesophagus and some brain tumours, cures are sometimes obtained, but such favourable results are still very few and far between Taking the three body cavities generally, the radiotherapist is in the position of having to irradiate a tumour that he cannot see, with a dose the adequacy of which he cannot gauge, by a technique the accuracy of which he cannot by any means always be certain In view of these facts it is not surprising that surgical removal of tumours in these regions is to be preferred unless the condition is inoperable or known to be extremely radio sensitive

The extent of the disease.—Advanced local disease, the presence of fixed regional lymph node metastases or distant metastases will reduce radiotherapeutic treatment to a palliative level.

The general condition of the patient —As in the case of a major surgical procedure so a radiotherapeutic procedure may have to be abandoned or mod fied because of the age or general condition of a patient

Aim of palliative treatment

The aim in palliative therapy is to prolong life usefully and in comfort and one must at all times avoid prolonging the act of dying To this end treatment must be given with care and discretion so that it does not add to the miseries the patient already has to bear Symptoms such as pain haemorrhage and discharge and obstructive symptoms such as dysphagia and dyspnoea can be frequently relieved without severe reactions or undue upset of the patient

Radiotherapy as an adjunct to surgery

Help from the combination of surgery and rad otherapy is usually sought when there is some doubt concerning either operability or the completeness of an operation already performed In the first case it is hoped that a course of pre operative irradiation will bring a doubtfully operable tumour into the bounds of operability at the same time minimizing the risks of dissemination that may accompany the operative act by slowing down the growth rate of the tumour cells In the second case a post operative course of radiation may be given in order to destroy any malignant cells conceivably remaining after the operation It must be emphasized that post operative radiation should be given only if there is reason to believe that malignant cells are present If a tumour is really operable and an operation for its removal is properly performed there should be no indication for post operative ... been emoved There s no ev dence ... ore ... ust therefore be regarded as a misnomer Radiotherapy cannot offer any counterpart to prophylaxis as understood by the immunologist and there is no sound basis for the practice at one time common of giving small doses of rad ation to apparently normal tissues in the pious hope that further trouble would be avoided Post operative treatment to be effective must be given in full doses

There is ample evidence to show that pre operative and post operative radiation can be of definite value particularly in the treatment of cancers of the breast upper jaw and fundus uteri and certain salivary gland tumours Nevertheless it must be constantly borne in mind that the availability of radiotherapy should not act as an incentive to operate on inoperable cases or to diminish the extent of an established radical cancer operation

Benign Tumours

... rad at on treatment because the tumour is of a type ... mon ... hyper ... omas ... sho ld be treated by radiot erapy ... choice ... ccompanied by ... treated by radiation

cautions if the patient is to be spared the cosmetically unwelcome sequelae of cutaneous atrophy, depigmentation and telangiectases, any one of which may detract from the patient's appearance far more than the original tumour

INFLAMMATORY AND MISCELLANEOUS CONDITIONS

Whereas the purpose of treating tumours is to eradicate dangerous or unsightly tissue with which the body cannot deal, in the case of inflammatory processes or manifestation of unknown or doubtful aetiology, the purpose is to assist gently [illegible] e an organ to [illegible] excessive, its

[illegible]

COMPARISON OF RADIUM AND X-RAY THERAPY

[illegible]

either can be used as an equally satisfactory alternative, the choice being frequently made on grounds of availability, technical simplicity or economy

CONDITIONS FAVOURABLE TO X-RAY THERAPY

X-ray therapy can be used in preference to radium therapy in the following circumstances

(1) Whenever the irradiation of large volumes of tissue is necessary, as is usually the case in dealing with radio-sensitive tumours which disseminate widely or are systemic in nature, as for instance ovarian, testicular and nasopharyngeal cancers, Hodgkin's disease, leukaemias and lymphosarcoma

(2) *For the treatment of deeply seated disease, for instance inaccessible cancers* arising in the body cavities It is physically and technically much easier to deliver

[illegible]

adopted

(4) For purposes of palliation X-ray therapy imposes less strain on the patient since individual x-ray treatments are usually short, technique is simpler and one tries to avoid allocating any part of a valuable store of radium for palliative use when the same radium may be used for curative treatment.

(5) *Most non malignant conditions These should be treated by x ray therapy* as this form of treatment is usually quicker and simpler to undertake and is safer for the patient since normal tissues are more easily protected against x rays than against radium Moreover, the personnel in a radiotherapy department are saved unnecessary handling of radium

CONDITIONS FAVOURABLE TO RADIUM THERAPY

Radium therapy should be used in preference to x ray therapy for the following conditions

(1) Malignant tumours of moderate radio sensitivity which are limited in extent and are accessible, or at the most situated at a limited depth below the body surface for instance carcinoma of the buccal cavity, larynx, pharynx, upper jaw and *cervix uteri and tumours of the ano genital region*

(2) Squamous-cell carcinoma deposits in lymph nodes of the cervical and inguinal regions

rather

ous than other available therapeutic agents

Experience does in fact show that most of the so called radio-curable cancers are best treated by radium Furthermore, the ability to implant radium needles or seeds into the tissues to insert radium tubes into narrow body channels the ease with which radium moulds can be made for accurate application to irregular surfaces and wide areas endows radium therapy with a technical flexibility that x ray *therapy cannot equal Because of these facts a valuable though limited field for radium will undoubtedly exist as long as radiotherapy remains a recognized* method of treating malignant disease

PREPARATION AND CARE OF THE PATIENT DURING AND AFTER *RADIUM TREATMENT*

For all but the simplest radium treatments for example the surface application of radium for early skin or lip cancer the patient should be carefully examined and his ability to stand the proposed course of treatment assessed on general grounds Thus the discovery of a serious cardiovascular, pulmonary or renal lesion or of diabetes, might influence greatly the amount, and *possibly the method of administration* of the treatment A blood count and Wassermann reaction should be done on all cases and x ray pictures taken to investigate possible local or metastatic spread of the disease A biopsy should be performed as a routine diagnostic procedure wherever possible

As an important preliminary to the treatment of cancer of the mouth or pharynx dental sepsis must be dealt with Although this does not mean indiscriminate ... should be extracted Where doubt exists it ... t to keep the mouth ... should extractions ... isk of the development of osteonecrosis of the jaw Following dental extraction an interval of about 10 days should be allowed to elapse before instituting treatment, thus allowing the

gums to heal and any sepsis to subside In very septic cases systemic and local penicillin may be required

The discernible effects on the patient following irradiation are termed the reaction Such reaction may be either purely local affecting only the tissues both normal and abnormal which are directly subjected to irradiation or some degree of constitutional upset or so-called systemic reaction may also occur

Local reactions are unavoidable when the high doses necessary to eradicate [illegible] nt not [illegible] greater [illegible] if the rate of administration of the treatment is rather rapid Because of this systemic reactions are much more commonly encountered with x ray treatment than with radium treatment because the latter tends to be restricted to localized lesions

LOCAL REACTIONS

Local reactions to radium therapy which produce symptoms calling for relief are those due to the mucous membrane and skin react ons The mucous membranes

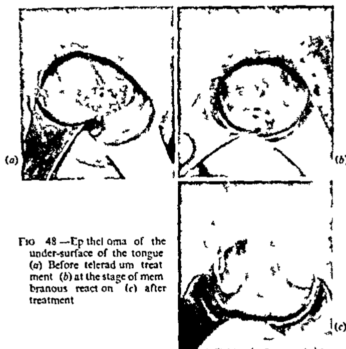


FIG 48 —Ep thel oma of the under-surface of the tongue (a) Before telerad um treat ment (b) at the stage of mem branous react on (c) after treatment

most likely to be subjected to rad um treatment are those of the buccal cavity pharynx larynx vagina and external genitalia whilst the skin areas concerned are those of the head and neck external genitalia and inguinal regions

In both cases the onset of the reaction is characterized by a latent period of

10–14 days, the mucous membrane changes usually appearing first. Reactions may persist for several weeks, and because of the delayed onset and persistence of a reaction after treatment is finished, a patient is often discharged home, either before the full reaction is developed, or before its climax is passed.

Character of Mucous Membrane Reaction

The [illegible]

me [illegible]

ap[illegible]

formation is preceded by a stage of redness, congestion and dryness, associated viscidity of the normal secretions.

In the mouth or laryngopharynx

As can be well imagined, these changes occurring in the mouth or laryngopharynx are a source of pain and discomfort, and they interfere appreciably with chewing and swallowing. Although no direct attempt should be made to interfere with the reaction, mouthwashes should be employed frequently to remove sticky secretions and relieve discomfort. Glycerin and thymol, Dettolin, and sodium bicarbonate make excellent mouthwashes. Should pain be marked, aspirin or Nupercaine solution (1 : 1,000), should be used in addition to the ordinary mouthwash. The patient's efforts must be supplemented by routine daily irrigation of the mouth by means of a Higginson's syringe or compressed air spray if available. Dettolin is a useful solution for irrigation purposes and if sepsis or a sloughing neoplasm is present a solution of sodium hypochlorite or penicillin should be used.

When the reaction from the treatment is super-added to any organic interference with mastication and deglutition, the problem of feeding becomes one of the utmost difficulty. It is surprising to find, however, how much can be achieved with the aid of suitable diet, local anaesthetics and encouragement of the patient. The diet is of necessity semi-solid or fluid in character and is so chosen as to give a minimum of 2,000 calories per day. The local anaesthetics that have been found most useful are compound benzocaine lozenges or Nupercaine lozenges, given just before the meal, a 1 : 1,000 Nupercaine gargle, or better still an emulsion of benzocaine (in fine powder form) and paraffin.

Benzocaine	3 gr	200 mg
Emulsion of liquid paraffin to	120 min	8 ml

In spite of the co-operation and encouragement of the patient and the perseverance of his attendants, there occasionally comes a time, usually towards the latter part of the course of treatment, when these measures fail. In such instances feeding by means of a nasal tube will often help to maintain a patient in a sufficiently satisfactory state of nutrition until the treatment is finished. The average intelligent patient can be taught to pass the tube himself. When loss of weight continues and all else fails, a gastrostomy may have to be performed before the general condition of the patient shows marked deterioration.

Laryngeal cancer.—In the case of laryngeal cancer, dyspnoea and stridor are serious symptoms which may be due to obstruction of the airway by growth or by reaction produced by the radiation treatment. It is of utmost importance to identify which of the two causes is operative since the treatment necessary differs for each

If symptoms are due to mechanical obstruction by growth the quickest way of relieving them is by careful radiation which reduces the bulk of the growth with resultant re opening of the airway If on the other hand obstruction is due to

a tracheotomy is rarely cured and if this operation has to be performed it usually renders the treatment purely palliative in nature

Cancer of the cervix

Following the radium treatment for cancer of the cervix the mucous membrane of the uterine and cervical canals is completely destroyed and the mucous mem brane of the vaginal vault becomes covered by a thick fibrinous membrane Clinically these changes do not produce any symptoms other than a yellowish in offensive vaginal discharge which persists for several weeks after treatment and then subsides The patient as a rule does not complain of any symptoms calling for relief other than mild diarrhoea or dysuria due to irradiation of the adjacent rectum and bladder Nevertheless a 2 pint daily douche of Dettol or Milton (1 tablespoonful to 1 pint) is advisable for hygienic purposes and also to prevent adhesion of the vaginal walls with consequent obliteration and narrowing of the vaginal canal Douching should be continued for about one month after comple tion of the radiation treatment

External genitalia

The local treatment required for the reaction of the mucous membranes of the vulvo urethral region and the glans penis is the same as for the skin of the inguinal regions and will be discussed later The tissues in these regions are however very sensitive and reactions tend to be both marked and painful Dysuria is an inevitable accompaniment of these reactions because the urethral mucous membrane always receives some irradiation

The pain can best be dealt with by local application of an anaesthetic ointment for the dysuria a potassium citrate and hyoscya mus mixture is usually sufficient



FIG 49 —Showing sk n reaction after telerad um treatment to cancer of the buccal cavity Note the p mentat on and drv desquamat on and small central area of moist desquamation

CHARACTER OF SKIN REACTION

The character of the skin reaction depends in part on the dose the region treated the technical method used and rate of adminis tration of the radiation If moderate daily doses are given over a period of several

weeks an erythema is observed followed by epilation, depressed activity of the sweat and sebaceous glands, pigmentation and dry desquamation of the superficial layers of the skin (Fig 49) Reactions of this type usually heal well, leaving a pale, depigmented, hairless, dry scar which may later develop telangiectases The rapid administration of a high dose usually results in an erythema accompanied by oedema and vesication followed by moist desquamation If an excessive dose is given painful chronic ulceration may be produced

Treatment of skin reaction

The practice with regard to the treatment of skin reactions occurring after radiotherapy varies enormously, and in the main seems to depend on the individual preference of the therapist Since the earliest days some form of ointment or oily dressing has been used with the idea of soothing and protecting the skin Chief [illegible]

much used dressings

Ointments and oily solutions have, however, several disadvantages for should the skin be broken an ointment tends to obstruct drainage and if infection ensues it is likely to increase its spread Furthermore, greasy or oily preparations seem to increase the severity of any reactions that may occur For these reasons the routine use of oily substances has been largely abandoned and methods such as the following are now commonly practised

[illegible]

the stage of redness is reached the patient may be allowed to wash the treated part, [illegible]

[illegible]

a natural dressing requires the minimum of attention and when it separates off new epithelium is usually present beneath

For certain sites, such as the axillae, breast regions, groins and ano genital regions, it is impossible to leave the irradiated areas open to the air unless the patient is confined to bed in hospital, which is only occasionally justifiable In these cases resort must be made to non adherent antiseptic dressings, of which proflavine emulsion (1 1,000) is perhaps the best An aminacrine hydrochloride ointment may also be required as a dressing for limited reactions in the head and neck region for patients who have to carry on with their work and object to being discoloured by gentian violet This ointment should be used with care because some patients are sensitive to it

Aminocrine hydrochloride	0 1 per cent
Distilled water * Eucerin (Anhydrous)	equal parts to 100 per cent

REACTIONS IN THE REGION OF THE EYE

The care of radiation reactions in the region of the eye is of special importance, both because of the ease with which complications may occur, and the alarm they cause The eye is not specially intolerant to radiation as was at one time thought The skin of the lids and the conjunctival mucous membrane respond in the same way as skin and mucous membrane elsewhere The cornea, being avascular, does not show any visible reaction, although keratitis and corneal ulceration may occur if the technique is faulty The lens can be damaged by radiation, particularly in children when high doses are used A cataract may occur several years after treatment and this risk, though often avoidable may have to be accepted when treating malignant disease The iris, choroid and retina do not, as a rule, show signs of damage with ordinary therapeutic dosage Aqueous aminacrine hydrochloride solution (1 2 000) in an eye bath, is the simplest and most satisfactory treatment for the radiation reaction of the lids and conjunctiva The patient is instructed to [illegible]

ment instilled into the eye It is of the utmost importance that any patient with an unduly severe eye reaction should be seen by an ophthalmologist

There are two sequelae of the radiation treatment of lesions of the lid, about which patients frequently complain The first and commonest is persistent epiphora due to stenosis of the lower lacrimal canaliculus There is no satisfactory method of prevention or treatment of this complication As a rule the epiphora becomes less marked with time and the patient becomes accustomed to it The second complication is deformity of the lower lid in the form of ectropion or entropion If severe enough to warrant it these conditions can be remedied by operation

COMMONER SEQUELAE OF THE MUCOUS MEMBRANE REACTION

Buccal cavity

Persistent dryness of the mouth is a common and troublesome complaint and unfortunately there is very little that can be done because the secretory glands of the buccal cavity and frequently the main salivary glands are permanently damaged by radiation Frequent sips of water help and many patients carry small bottles of water with them Sucking "acid drops" sometimes helps, and lettuce lozenges (*Royal National E N T Hospital Pharmacopoeia*) are worth a trial Many patients complain of waking up at night with a very dry mouth and for these cases half a teaspoonful of liquid paraffin slowly worked round the mouth and then swallowed often gives temporary relief

The pharynx

Persistent dryness with minor difficulties in swallowing particularly of dry foods, is the chief complaint The approach to this problem is the same as for the buccal cavity, but any difficulty in swallowing after treatment must be investigated. Its cause may be lack of normal secretion persistence or recurrence of neoplasm, or post radiation narrowing of the pharynx, which may occur after healing of a

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The skin is kept uncovered and as dry as possible, using starch and boric powder, or talc, as a dusting powder if the patient sweats a great deal, otherwise no application is used until there is redness accompanied by soreness and discomfort Until the stage of redness is reached the patient may be allowed to wash the treated part, but shaving (other than with an electric razor), friction and exposure to extremes of temperatures are to be avoided When erythema occurs, washing with soap and water should be stopped and aqueous aminacrine hydrochloride solution (1 , 1,000) is applied to the skin in liberal quantities and no covering dressing is used The aminacrine hydrochloride acts as a detergent and antiseptic, and cleans, soothes and hardens the skin If and when moist desquamation occurs, aqueous gentian violet

irradiated areas open to the air unless the patient is

justifiable In these cases resort

of which proflavine emulsion

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for the radiation reaction of the lids and conjunctiva The patient is instructed to bathe the lids and conjunctival sac night and morning and if the lids tend to stick

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Commoner Sequelae of the Mucous Membrane Reaction

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The pharynx

cause may be lack of normal secretion persistence or recurrence of neoplasm, or post radiation narrowing of the pharynx, which may occur after healing of a

pharyngeal neoplasm In the case of post radiation stenosis gentle dilatation of the narrowed segment of the pharynx may be indicated

The larynx

Very occasionally a patient who has been apparently cured of a carcinoma suddenly develops dyspnoea and stridor due to oedema of the larynx The oedema may be caused by post radiation perichondritis of the larynx or recurrent growth with infection but not infrequently it is a simple post radiation effect without any sinister cause For immediate relief of symptoms the treatment is the same as for oedema occurring during radiation with the exception that there need not be the same reluctance to perform tracheotomy If any definite cause for the oedema can be found the appropriate treatment should be undertaken

The rectum

Special rectal complications may occur following the radiation treatment of carcinoma of the cervix uteri The most important of these is the so-called late rectal reaction Its onset (about 6–9 months after treatment) is usually typical a patient who has been perfectly well develops pain diarrhoea and tenesmus with the passage of blood and mucus in the stools On rectal examination there is thickening of the recto vaginal septum sometimes in association with board like infiltration of the perirectal tissues On the anterior rectal wall at the level of the cervix there may be a hard infiltrated swelling or an excavated ulcer which may resemble an epithelioma and is in fact called pseudo-carcinoma of the rectum These lesions often heal but sometimes a recto vaginal fistula forms or the infiltrated perirectal tissues may contract and produce some degree of rectal stenosis

The treatment of the acute phase of a late rectal reaction is rest in bed with a blan[illegible]
but
warr
paraffin If rectal pain and tenesmus are marked Nupercaine suppositories should be used

COMMONER SEQUELAE OF THE SKIN REACTION

Infection

Minor degrees of infection may occur particularly in out patients who are casual about carrying out instructions given them Usually patients having ointment dressings are the sufferers The ointment should be wiped away and all crusts removed by means of a starch poultice This poultice is made with 4 tablespoonfuls of whit
starch
has dis
applied directly over the sore it is covered with gutta percha tissue and bandaged in position Aqueous gentian violet solution should then be applied to the cleaned surface alternatively compound flavazole powder or sterile sulphathiazole powder containing 10 000 units of penicillin per gramme may be used For a large area which has to be kept covered penicillin cream can be used Special care is necessary with the last two preparations because of the risk of sensitivity Any improvement obtained usually occurs within 2 3 days and the application should not be

continued much longer than this If local sepsis is marked or constitutional symptoms develop systemic penicillin should be given

'Eczematized' skin reaction

A skin reaction associated with exudation and crusting sometimes flares up, and presents all the appearances of an acute eczema super added to the main reaction area and affecting the neighbouring skin and often distant parts not directly irradiated This eczematization may be due to sepsis idiosyncrasy to the dressings applied or an allergic response to the exudate which acts as an irritant to the tissues with which it comes into contact It is more likely to occur on skin areas normally moist and warm and subjected to friction The affected part should be cleaned, all crusts removed and gentian violet solution applied For ambulant patients with reactions of this kind affecting the face the following zinc peroxide cream is a good and more acceptable alternative

Zinc oxide	150 gr	10 g
Zinc peroxide 20 per cent	30 gr	2 g
Wool fat	60 gr	4 g
Solution of calcium hydroxide	30 min	2 ml
Arachis oil	½ fl oz	15 ml

If there is any associated constitutional upset the patient should be confined to bed In those cases in which an eczematous eruption appears on parts distant from the radiated area calamine lotion or liniment should be applied locally to these areas and 10 millilitre whole blood injections given twice weekly If there is any question of the patient being an allergic subject the initial injection of whole blood is 1 millilitre

RADIONECROSIS

hinder progress in this form of treatment Today severe radionecrosis is only exceptionally encountered and the possibility of its occurrence is no longer con sidered to be a deterrent to treatment

Radionecrosis may be early or late in onset The early form comes on immediately

irritating applications such as carbolic iodine or mercury and local sepsis must be avoided at all costs

Radionecrosis of skin and mucous membrane

In both these sites painful and indolent areas of ulceration may occur in the treated part A radionecrotic ulcer has a typical appearance the ulcer edge being well defined and its base covered with a yellow slough and the tissues surrounding and underlying the ulcer are usually rather brawny Acute pain and tenderness are characteristic features

Radionecrosis of the skin if slight, can be treated by the application of aqueous gentian violet solution, or with an ointment of scarlet red, ½–1 per cent, with

Nupercaine base, 1–2 per cent Limited necroses usually heal spontaneously if kept clean and sepsis and trauma avoided In severe cases diathermy coagulation or excision, followed by plastic repair, may be necessary

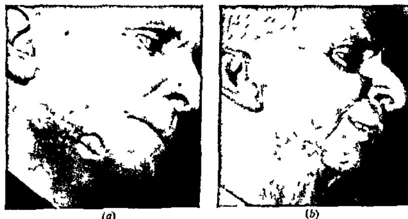
A small necrotic ulcer of the mucous membrane of the buccal cavity can be treated by irrigation with sodium hypochlorite or penicillin, and any pain controlled by local anaesthetics, or analgesics If necrosis is severe, diathermy coagulation of the ulcerated area may be necessary

Necrosis in the larynx and laryngopharynx is usually a fatal complication The patients suffer severe pain, sepsis is practically unavoidable and death follows from cachexia, septic broncho pneumonia, or haemorrhage

In the vagina, necrosis is usually associated with recto vaginal or vesico vaginal fistulae Spontaneous healing is exceptional, and surgical repair is not usually possible since the tissues are devitalized A colostomy or transplantation of ureters is sometimes necessary

Radionecrosis of bone and cartilage

The lower jaw is generally the commonest site of radionecrosis This complication usually occurs when the lower jaw has been invaded by neoplasm and the overlying mucous membrane and periosteum have been destroyed With the disappearance of the neoplasm after radiation, the invaded bone usually lies exposed in the mouth, and infection occurs with a spreading osteomyelitis Necrosis may also



(a) (b)

FIG 50 —(a) Radionecrosis of the lower jaw occurring 3 years after teleradium treatment of buccal cavity cancer (b) Same patient 18 months later, after removal of the bony sequestrum, and plastic repair of the buccal fistula

occur in the absence of direct bone invasion, particularly if the technique of treatment has been faulty, or if the irradiated jaw is injured by dental extraction The usual symptoms and signs are pain, foetor and ulceration in the mouth, with an exposed necrotic area of bone lying in the ulcer base Externally there may be swelling of the overlying skin and subcutaneous tissues, with abscess and sinus

treatment is
set, but with

chronic cases irrigation with antiseptics attention to diet and relief of pain are all that can be done until sequestration is complete When separated the dead bone should be removed and thereafter the tissues tend to contract and close any sinus present A buccal fistula once present rarely heals spontaneously and plastic repair should be considered

Sites of cartilage necrosis —The commonest sites for cartilage necrosis are the

the larynx in the region of the thyroid notch or the free margin of the epiglottis is not quite so serious as the dead cart lage can sequestrate without producing profound disturbances of either laryngeal or laryngopharyngeal function The

(and gastrostomy if

lieving pain and the

SYSTEMIC REACTIONS

The commonest systemic reactions are so called radiation sickness and changes in the blood count These reactions are prone to occur when large volumes of tissue are radiated and their exact cause is unknown

Radiation Sickness

Most patients experience loss of appetite and lassitude during a course of radiotherapeutic treatment but in certain cases persistent nausea with or without

of which a mixture of bismuth and hydrocyanic acid is the best Vitamins B_1 and C have also been widely used

On the whole the simplest remedies are best Adrenaline in water should be tried first and if this fails a bismuth mixture may be given finally Nembutal capsules should be tried As however no two patients respond alike if this line of treat ment is unsuccessful it should not be persisted in but some of the other drugs men tioned should be tried In the more severe cases of sickness radiation treatment must be suspended the patient kept in bed and any dehydration combated

Changes in the Blood Count

similar though less marked changes After cessation of irradiation the blood count usually returns to normal The irradiation of small volumes of tissue even to a high dose is not as a rule accompanied by a marked change in the blood count

Regular blood counts are performed as a routine on patients undergoing a course of radiotherapeutic treatment Anaemia, if present before, or occurring during treatment, must be corrected, and with few exceptions no patient with a haemoglobin level of less than 60 per cent should be treated by radiation

The changes attributable to radiation are seen in the white-cell and platelet counts A total white cell count of 2,000 per cubic millimetre, or a lymphocyte count of 300 per cubic millimetre, or a platelet count of 100 000 per cubic millimetre, is usually considered to be an indication for suspending radiation treatment Once these changes have occurred there is no certain way of restoring the blood count to normal other than by rest and waiting Injections of liver and a solution of sodium pentose nucleotide are worth trying when it is imperative that radiation be continued

GENERAL MEASURES

The general resistance of the patient should be strengthened both during and after treatment Anaemia and sepsis must always be taken seriously and controlled

[illegible]

recover from the effects of treatment

M LEDERMAN

X-RAY THERAPY

INTRODUCTION

History of X ray Treatment

The use of x rays as a method of treatment began almost immediately after Roentgen's discovery in 1895 and, within a few years, had been tried in almost every known disease There were some successes but there were many failures The [illegible] there were many accidents [illegible] ring [illegible] ases [illegible] the radiological workers themselves, frequently led to subsequent cancer formation

Knowledge has gradually accumulated and a vast literature has been published There is still much to be learnt but there is now an accurate understanding of the [illegible]

of accumulated knowledge of the clinical reactions and sequelae

Radium Treatment

The treatment of disease by the radiations from radioactive substances, particularly radium, has also been carried out continuously since the discovery of radium by Marie Curie in 1898 The problems encountered were very similar, there were similar dangers and sequelae

Development of Radiotherapy

[illegible]

radium in comparison with x rays It is however, generally recognized that these two methods of treating disease by radiations should be considered together as a single method of treatment namely radiotherapy

There are some conditions which can be treated with equal success by either x rays or radium There are some conditions in which x ray therapy may be indi [illegible]

minimum of damage to surrounding normal tissues There are also some conditions in particular carcinoma of the uterine cervix, in which a combination of radium and x rays is frequently used to obtain both these effects

This discussion of x ray therapy will therefore overlap, in many places the field of radium therapy The clinical reactions are essentially similar as are the factors involved in radio sensitivity The choice of the method of treatment to be used is sometimes determined mainly by the particular experience and training of the radiotherapist There are however, certain accepted and well defined indications for x ray therapy which can here be emphasized

Physics of X rays

X rays are wave lengths which are part of the electromagnetic spectrum They are shorter than ultra violet waves and as commonly used up to the present time, are longer than the rays of radium They are produced by the transformation of electrical energy inside a vacuum tube to the ends of which a difference of electrical potential is applied

The beam of x rays produced is a composite one of varying wave length the [illegible]

Among other properties of x rays are the powers of penetrating through matter —in the case of x ray therapy the tissues of the body—and of causing certain biological effects The shorter wave lengths penetrate to a greater depth while the [illegible]

beneath the surface of the body Machines working at 2 000 kilovolts and higher are now being constructed and used for clinical work Some of the rays produced at these voltages are of the same wave length as and are identical with the γ-rays from radium and other radioactive substances

BIOLOGICAL EFFECTS OF IRRADIATION

The biological effects produced by x rays or by the radiations from radioactive substances, when applied to living cells and tissues, are of a damaging or destructive nature *There is no evidence that any true stimulating effect is ever produced* Small dosage will cause inhibition of activity and sufficiently large dosage will eventually cause complete destruction and necrosis of any tissue

CELLS

There is, however, some selectivity in the production of the effects Certain types of cell and certain tissues are more sensitive to the rays and are either inhibited in *their activity or destroyed by doses of radiation which* cause no apparent permanent damage to the tumour bed

The factors involved in radio sensitivity are numerous and complex They pertain not only to the type and state of activity of the cells of the tumour but also to the cells and tissues which comprise the tumour bed

radiation than when they are in a resting stage

ORGANS AND TISSUES

A study of the action of radiations on all the normal organs and tissues of the body While it onsidera of special degrees of sensitivity

The skin

The tolerance of the skin is *frequently the determining factor in limiting the dose* which can be given by x ray therapy The basal cells of the epidermis are the most resistant ed es, leaving a denuded basement membrane The achievement of this process ares about 7–10 days, depending on the size of the dose delivered, and accounts for the apparent delay in the appearance of any *clinical reaction following treatment* Healing takes place by the growing in of new basal cells from the periphery of the treated area and by a restoration of mitotic activity of groups of cells which have escaped destruction throughout the treated area

The dermis shows less dramatic immediate changes but may be severely and permanently affected There is an immediate increase in vascularity through vaso-

dilatation but this is succeeded by a diminution in blood supply through end-

which is sufficient to produce an erythematous reaction

treatment involving the whole of the thorax or abdomen may even be reduced to levels of 200 or 300 per cubic millimetre The neutrophil polymorph count is less

changes in the platelet count are of even more importance than those of the leucocytes and judge the tolerance dose which must not be exceeded to have been reached when the platelet count drops to 100,000 Changes in the blood picture may be complicated by other factors than irradiation For example, a patient

blood picture in most cases will have returned to normal within 3 or 4 weeks of the end of a course of treatment

The effects on blood vessels consist first in vasodilatation with resulting ery-

larger vessels, but the smaller vessels and capillaries show progressive occlusion due to fibrotic changes, with marked diminution in vascularity of the whole area treated

The ovary

The effects of irradiation on the ovary are of considerable importance, as it may receive substantial dosage during the treatment of any condition in the female pelvis and because its sensitivity is such that radiotherapy in moderate dosage can be used to destroy its function The cumulative effect of multiple small doses, such as may possibly be received by a careless worker in an insufficiently protected department, may also be enough to produce temporary, or even permanent, amenorrhoea

The main effects are on the follicles, which become progressively more radio- [illegible]

maturity Clinically, such a young woman, following exposure, will have a period of amenorrhoea followed at some uncertain interval by restoration of menstrual function In the case of a woman of 40 years or over, who is approaching the end of her reproductive life, the ovary is more sparsely populated with follicles, and those which are present are in various stages of maturation and therefore of greater sensitivity The same dose of radiation will in this case produce a complete and permanent menopause Although heavy dosage is needed to produce gross changes in immature follicles which will lead to their destruction, there is an increasing amount of evidence to show that even small doses may cause effects, such as an increased rate of gene mutation, which may have some later genetic effect, and possibly lead to inherited deformities in subsequent offspring

The testis

The testis is also sensitive to irradiation The most sensitive cells are the spermatogonia and with differentiation to the adult spermatozoa there is progressive *radio-resistance In the case of a single dose to the testis sterility may not be im-*mediate, as the more resistant spermatids and spermatozoa may have escaped the destruction of the sensitive spermatogonia After an interval sterility may be complete, but it is unlikely to be permanent unless heavy or repeated dosage is given, as repopulation of spermatogonia will take place The interstitial cells of the testis are much more resistant, and sterility from irradiation is not accompanied by changes in secondary sexual characteristics and usually has no effect on sexual power

MALIGNANT TUMOURS

[illegible] slowly growing ones

[illegible] however, not only are the [illegible] umour bed receive almost [illegible] an important part in deter- [illegible] of the tumour bed are com-
posed of cells which are radio sensitive [illegible] considerable difficulty and danger in irradiating a tumour which, if situated elsewhere in more resistant tissues, would be readily amenable to radiotherapy

[illegible] lio sensitivity [illegible] re important, [illegible] o treatment

Tumours which have an inadequate local blood supply such as those arising in scar tissue are also found to be more radio resistant Typical examples are

infiltration and phagocytosis, and for this an adequate blood supply is essential

There is an increased radio resistance of growths in the presence of bacterial infection In addition heavy irradiation will provoke exacerbation of infections with a greater liability to necrosis of normal tissues

Previous irradiation which has been unsuccessful especially if it has been given in small doses spread over a long time, induces radio resistance in previously radio sensitive tumours There is evidence that the actual cells of the tumour become more resistant, but, in addition the normal tissues, having been previously dam aged, are less resistant and have a fibrosed and inadequate blood supply

Anatomical site

There are differences in radio sensitivity according to the anatomical site in which a tumour may occur Squamous epithelioma of the skin of the face or lip usually responds well to treatment, while a growth of very similar histological appearance arising on the vulva is usually found to be radio resistant

Macroscopical type

oscopical type of
the most radio
isitive while the

Radio curability

ensitivity in the treatment of
uitable for radiotherapy this
types of malignant tumour,
composed of radio sensitive cells with many mitoses and a good blood supply, diminish rapidly and disappear following moderate dosage with x rays or γ-rays Unfortunately such tumours also frequently produce early and widespread meta stases and the proportion of permanent cures is much less than in other growths with more moderate radio sensitivity but with less frequent metastases

SYSTEMIC REACTIONS TO RADIOTHERAPY

The clinical reactions of a patient undergoing radiotherapy may be severe and may give rise to considerable discomfort and pain during a prolonged course of treatment such as may be necessary in the radiotherapy of some forms of malignant disease

In many instances the best results are obtained by prolongation of the course of treatment over periods of 5 and 6 weeks and perhaps even longer The dose is spread out in this way so as to minimize the reactions of the normal tissues and to

improve the radio-sensitivity of the tumour by irradiating over a long period during which more tumour cells are likely to be found in the stage of mitosis The very length of the treatment is sometimes a strain on the patient and may have a depressing effect on morale General or constitutional reactions usually occur only when heavy dosage is given, as in the treatment of malignant disease

Radiation Sickness

During the course of treatment there may be some degree of radiation sickness, the exact pathology of which is still the subject of considerable debate It occurs most frequently if massive, highly radio sensitive tumours are made to disintegrate rapidly with absorption into the blood stream and, especially, if large volumes of tissue in the thorax or upper abdomen have to be irradiated The symptoms vary from slight nausea, headache and anorexia to severe vomiting, dehydration and prostration It is usually relieved by reducing the daily dose of treatment, but rarely may be a persistent and troublesome complication

Such symptoms may be mainly psychological in origin and associated with the necessity for daily treatment, especially if the patient is of nervous disposition and realizes or suspects the diagnosis In these cases the symptoms may be quickly relieved by appropriate sedatives Radiation sickness is probably caused by absorption into the circulation of histamine-like substances resulting from tissue breakdown The specific remedies which have been suggested are legion, each succeeding one having an ephemeral popularity

Treatment

The methods of treatment which have been *found to be most successful over a* period of time are (1) the maintenance of an adequate fluid intake—5 pints is aimed at in each 24 hours, *(2) adequate bowel elimination, (3) adequate rest and*

has been reported to be of value in

ie is 25 milligrams

to be repeated at

intervals of 24–72 hours as needed throughout the remainder of the treatment

Blood Picture

The other main general reaction caused by radiotherapy is an alteration in the patient's blood picture, some details of which have been described above

LOCAL REACTIONS TO RADIOTHERAPY

Skin

Within a few hours of exposure to x rays or γ-rays a slight transient erythema will appear It disappears within 48 hours and there is no further obvious reaction

of the skin until about the twelfth day, when there appears a gradually deepening erythema, accurately delimited to the area irradiated The exact time at which this erythema appears and the rapidity with which it progresses depend on the size of the dose and the time over which it is delivered The erythema progresses to a deep red over a period of 5–10 days and then, again according to the size of the dose, there may be either a dry desquamation of the epidermis or, with heavier dosage, vesication and shedding of the epidermis, leaving a raw, moist area This moist desquamation reaction is the maximal reaction which should ever be attained in radiotherapy The basement membrane is denuded of epidermis but there is no destruction of tissues of the dermis Provided the area is kept clean and free from infection this reaction heals quickly Basal cells grow in rapidly from the edge of the irradiated area and islets of basal cells also appear in the centre of the denuded area These are cells which have escaped destruction, perhaps because they are situated in hair follicles deeper to the basement membrane Trauma must be

some pigmentation which may last for even 1 or 2 years but which usually disappears in the course of 1 or 2 months There is also particularly when wide areas have been treated, some loss of elasticity of the skin due to fibrosis and to the diminution in blood supply of the dermis

MUCOUS MEMBRANES

The local clinical reactions seen on a mucosal surface, such as the pharynx, are analogous to those of the skin but all stages of the reaction occur at a slightly earlier time after the beginning of treatment Following the initial transient erythema the second or real erythematous reaction starts at about the seventh day and proceeds rapidly to desquamation of the area treated This is noted clinically

resultant healed area is usually indistinguishable from normal mucosa except that there is again some dryness due to destruction of mucous glands and also due to inhibition of salivary secretion, if the salivary glands come within the fields of irradiation

These reactions of skin and mucosa may cause considerable pain and discomfort The skin reaction may be in a situation where it is not possible to avoid the irrita-

only is there inevitably some degree of pain during eating and drinking but the associated drying up of mucus and of salivary secretions causes the saliva to become

thick and tenacious and difficult to swallow or to spit out There is also some loss

The reactions which have been described are those which are produced inevitably during the course of radiotherapy of some cases of malignant disease They are the maximum which the normal tissues will tolerate without permanent ... prolonged

with few exceptions the level of dosage is *not so high and the immediate local and general* reactions should not be severe if appreciable at all clinically

EFFECTS OF EXCESSIVE DOSAGE

to severe and intractable pain *The* blood supply of the part is damaged so that there can be no adequate inflammatory reaction and an area of necrosis develops *showing little or no tendency to heal In severe cases the only practical treatment is* to excise the whole area down to healthy tissue with intact blood supply and to make good any defects in tissue by extensive grafting

Necrosis

Necrosis is particularly liable to develop after heavy irradiation of bone or ... ase of

Late necrosis in an area which has had heavy treatment may sometimes occur after a lapse of many months or even years if the area is subjected to physical trauma or bacterial infection It is important to guard against sunburn or exposure to frost and cold winds after radiotherapy of an extensive epithelioma of the face or of the lip and dental extractions subsequent to any irradiation of the mandible in the course of treatment of a growth of the tongue or tonsil should be avoided if possible or at least carried out with the utmost care one tooth at a time

INDICATIONS FOR X RAY THERAPY

The pathological conditions for which x ray therapy is now cons dered to be of value may conveniently be divided into four groups as follows

CONDITIONS NECESSITATING SMALL DOSAGE

The first group is usually treated by a series of small doses spaced at intervals varying from 3 to 4 days up to 1 or 2 weeks The size of each individual dose may be 100 r or less and this may be repeated for 3 or 4 or up to 6 or 8 times Conditions which have been treated with success in this way include some acute and subacute

staphylococcal and streptococcal infections, some chronic infections such as tuberculous cervical adenitis, many types of dermatosis, and some forms of keratitis

The exact mechanism of action of these small doses of radiation has not been satisfactorily explained It is quite certain that doses of the order described can have no inhibitory or destructive action on bacteria which withstand doses many times greater than any normal tissue will tolerate The action must be one which affects the normal processes of inflammation and repair Various theories have been propounded including vasodilatation with an increased rate of diapedesis or destruction of the radio sensitive lymphocytes with liberation of antibodies This method of treatment has evolved empirically and it has been found that in almost all the conditions the most beneficial effects are obtained when the dosage is kept low, and that high dosage will not produce improvement but may be followed, especially in acute and chronic infections by exacerbation of the inflammatory condition Each individual dose is much below the level which will produce an erythema and, in the past, it was thought that such dosage could be repeated almost indefinitely without producing tissue damage Unfortunately there is a cumulative effect of even small doses and if too frequently repeated, they may lead to sclerosis of the skin, unsightly telangiectasis and later necrosis and even epithelioma formation Caution should therefore be used in the treatment of recurrent conditions, and x ray therapy should never be prescribed without first ascertaining what treatment has previously been given

For this group of conditions so called superficial x ray therapy is used, with x rays of relatively long wave-length generated at voltages up to 100 or perhaps 120 kilovolts

Staphylococcal and Streptococcal Infections

Acute localized infections such as boils and carbuncles have been treated by x rays in the past with some success In the early stages they may be aborted There is a definite reduction in pain and the inflammatory process is cut short by earlier localization and pointing Streptococcal infections, such as erysipelas, have also been treated by x rays in the past, with similar results of arrest of the advancing infection and earlier resolution There are, however, at the present time, more satisfactory and surer methods of dealing with these acute infections and x ray therapy is rarely likely to play any part

X-ray therapy may be of great value in certain subacute and chronic infections, such as long standing paronychia These may occur and continue with occasional acute exacerbations on one or more fingers of the housewife, whose hands are continually immersed in water, and they may prove resistant to many forms of treatment Usually they can be cleared up readily by a series of x ray treatments lasting over a period of 4 or 5 weeks

Tuberculous Infection

There has been much experience in the x ray treatment of some types of tuberculous infection The treatment of tuberculous adenitis gives a high proportion of satisfactory results In the [illegible]

when there is an abscess of the collar-stud variety with a subjacent caseating gland, and if the contents are too thick or the skin is in danger of becoming infiltrated and ulcerated, x-ray therapy may be combined with repeated aspiration or incision Such treatment will produce healing in a high proportion of cases At a later date, when the condition is quiescent, it may be advisable to remove a fibrosed or calcified gland or to excise an unsightly scar, for there is some evidence that this is safer and less likely to be followed by recurrence than if excision of a gland and abscess containing tubercle bacilli is immediately performed

Some successes are also obtained in the treatment of the plastic type of tuberculous peritonitis and in tuberculous epididymitis

DERMATOSES

X-ray therapy has for many years been an essential method of treatment in many conditions seen in dermatological practice In many types of subacute and chronic eczematous lesions it has been found to be the means of procuring healing when prolonged treatment by other methods has failed In some conditions which are certain or likely to recur, x ray therapy has frequently been used as a palliative to procure temporary cure or relief of symptoms Among such conditions are psoriasis, pruritus ani and pruritus vulvae The immediate effects may be almost dramatic and when recurrence occurs there is a natural tendency for the patient to seek again the same form of treatment There have been many accidents as the result of repeated treatment for such conditions, particularly in irradiation of the

to other safer, even if less effective, remedies

KERATITIS

In superficial punctate keratitis of the multiple erosion type, in acne rosacea ... of the cornea, x-ray ... l the lens, has ...ssful In acne rosacea keratitis, with its tendency to seasonal exacerbation or recurrence, there may be the same danger of possible damage through repeated treatments In the majority of cases, however, x-ray treatment will cause alleviation of symptoms for several years before recurrence occurs, and provided minimal dosage is given tangentially to the cornea, there does not seem to be undue risk in repeating this treatment on several occasions over periods of 15–20 years

CONDITIONS DEMANDING HIGHER DOSES

This second group includes various pathological conditions which appear to need a somewhat higher dose to obtain the most satisfactory results It is a somewhat ... collection and includes some arthritic conditions, keloid scars,

... ed in the ... he treatment of the various conditions It is convenient, however, ... nditions

fully understood and techniques have developed empirically

ARTHRITIC CONDITIONS

Ankylosing spondyl tis

During the last 10–15 years the value of x ray therapy in ankylosing spondylitis has gradually become more widely recognized and cases of this disease which



FIG 51 Advanced case of ankylos ng spondyl s w th calc fi cat on of nterver ebral l gaments ankylos s of sacro- l ac jo nt and marked nvolvement of both sch a

calcification Even when there is a cons derable degree of calcification and perhaps the radiographic appearance of bamboo spine some increase in movement may be attained by the el minat on of muscle spasm With diminution in pain and muscle spasm there is also abolition of fever and night sweats in those patients who have toxic and febrile symptoms Their morale is improved appetite regained and they gain in weight

X ray therapy causes arrest in the progress of ankylosing spondyl tis This disease is naturally of long duration and may have periods of remission and relapse It will take many years to establ sh in such a chronic condition whether a method

of treatment can be classed as curative. Many patients have now shown no sign o recurrence of symptoms or advance in calcification over periods up to 12 years an longer, and it seems probable that x-ray therapy will be proved to be a method o curing the disease

The whole spine and sacro-iliac joints are irradiated by suitably arranged field in all cases, other situations, such as ischial tuberosities, iliac crests, the symphysi pubis, sometimes the os calcis, the manubrio sternal joint and other joints especially the hip joints, are also irradiated if they are found to be involved Th course of treatment usually lasts for about 4 weeks, with daily sessions As soon a

to prevent increasing deformity through muscle weakness

Physiological effects —This intensive course of treatment may sometimes caus nausea and general malaise, and attention must be paid to ensuring adequate res and sleep and suitable diet The irradiation of the whole spine causes a considerabl effect on the white-cell count and platelet count. These may drop to low level which may even necessitate temporary suspension of treatment Within 2 or 3 weeks of the completion of treatment the white-cell count and platelet count hav usually come back to normal levels Any recurrence is unusual in areas which hav been treated but in some patients a second course of treatment, after an interva of about 6 months, has been necessary for localized recurrence of pain There ar also some patients who develop signs of the disease in other joints and may need subsequent treatment for these

Osteoarthritis

In some cases of painful osteoarthritis pain can be relieved by x-ray therapy The results are uncertain, but appreciable relief is obtained in 40–50 per cent of cases This palliation is variable in duration In some cases it may last as long as several years, in others pain may recur within a few months X-ray therapy may succeed ... should be ... ed fre-

BURSITIS

Painful subdeltoid and subacromial bursitis will improve following x-ray therapy. Response is usually slow and there may be some exacerbation of symptoms at the beginning of treatment unless caution is used and the daily dosage is kept low.

KELOID SCARS

Keloid scars, if recent and still vascular, respond well to moderate doses of x-ray therapy or radium therapy The dose usually given is less than that which will cause an erythema and may be repeated 2 or 3 times at intervals of 1 or 2 months A keloid scar which is raised, red, perhaps causing some limitation of function through contracture, and giving rise to severe irritation and itching, will usually, in the course of 2 or 3 months, become softer, paler and less raised and indurated

Local irritation disappears and contracture diminishes with
of function of the surrounding joints, muscles or tendons

operative measure when plastic repair is being carried out
cuts on the face, limbs or trunk

Angiomas

Some types of angiomas are suitable for radiotherapy
naevus" with a dilated central vein does not respond to x
easily be dealt with by a needle and galvanic current or b
haemangioma the "port wine stain", which may extend c
face and neck and cause great disfiguration, is also quite un
ment Even after heavy dosage such areas do not lose their
when the dose has been so heavy as to cause scarring Th
more unsightly than the original condition It is likely to b
even years later, and may even give rise to epithelioma
cavernous haemangioma which appears at or shortly af
sometimes at the same rate as the general growth of the
rapidly, responds readily to x ray treatment or radium t
mately the same dosage as that used for keloid scars These
as raised, deep-red, strawberry like tumours, will in most c
spontaneous cure after several years There are some which
out treatment and rarely they may be seen in adult life S
growth may be rapid and alarming to the parents Their
interfere with feeding or with vision or they may become u
x rays or radium will cause a more rapid disappearance,

are suberythemal and not too frequently repeated, so that
the site of the lesion should, in most cases, become indistin
rounding normal skin

Actinomycosis

The treatment of actinomycosis has been included in th
been found that the best results have been obtained after a c

potassium iodide has, for many years, been the mainstay in the treatment of this condition, and cures are reported from this method of treatment alone, especially in the cervico facial infections The use of sulphonamides and more recently of penicillin has been tried extensively and some cases have been found to be sensitive to these agents and have been cured by them

In the writer's experience, the cases which remain healed after potassium iodide alone are a small minority and, in those treated by sulphonamide or penicillin, the usual effect has been to clear up the inevitable secondary pyogenic infection with temporary healing but with recurrence in the course of 1 or 2 months It has been found that the [illegible]
of potassium ic[illegible]
genic secondary [illegible]
the percentage c[illegible]
principles, incis[illegible]
many factors ir[illegible] method of treatment it is difficult to say how important is the part played by x-ray therapy, but certainly the addition of x-ray treatment has brought success when the other methods alone, or in combination, have failed There are a few reports also of series of cases treated and healed by x-rays alone In the cervico facial infections permanent healing has so far been obtained in all cases which have been treated by this method in the writer's series [illegible]

been few and far between

WARTS

The treatment of warts by x-ray therapy has been a common practice, many of them have been found to be radio-sensitive and good results have followed such therapy The infective plantar wart seen frequently in schoolchildren can almost [illegible]

of the foot, such as those seen beneath the heads of the second, third and fourth metatarsal bones when the anterior arch has become flattened Whatever treatment is given these will recur unless the orthopaedic deformity is rectified A single [illegible]

sequelae, but the dose is close to the maximum which will be tolerated, and can never be repeated with safety, in case of recurrence The usual situations in which warts occur, the feet and the hands, are sensitive to irradiation, and necrosis may be caused if heavy dosage is given, either in a single application or in repeated smaller treatments

was discontinued.

CONDITIONS IN WHICH X RAY THERAPY ALTERS OR DESTRO FUNCTION

The third group of cases which are treated by x rays includes those conditions which x rays are used to cause an alteration or destruction of function It includ the production of an artificial menopause, the treatment of thyrotoxicosis, an therapeutic depilation

Artificial Menopause

The induction of the menopause may be by either x rays or radium and each method effected has its protagonists Those who favour the insertion of radium into the uterine cavity point out that it is necessary, in most cases for which the pro cedure is indicated, to perform a preliminary dilatation and curettage, and that it is a simple and quick procedure, for surgeon and patient to ... same time It is claimed that in add ... sclerosing effect ...

x rays p ... e
after the ...
nausea fr ...
percentag ...
placed fro ...
There does not appear to be any ...
of menopausal symptoms such as ... headaches and hot flushes ... frequency or severity
commonly employed there may be some persistent watery discharge following radium treatment, perhaps caused by some degree of necrosis of the endometrium In cases in which it is inadvisable to give general anaesthesia, x ray therapy is certainly to be preferred

Ovarian dysfunction

In cases of profuse or irregular uterine haemorrhage due to ovarian dysfunction and occurring at or about the time of the normal menopause, the treatment of choice is frequently to produce an artificial menopause by radiotherapy In the absence of any complications, such as previous pelvic infection, and when the possibility of malignant disease has been ruled out by examination and curettage, x ray treatment may be given, possibly in a single treatment, but more usually, so as to avoid reactions such as nausea, in 3 or 4 treatments on succeeding days At this age the dose need not be a large one and sufficient dosage can be delivered to the ovaries without causing any clinical reaction on the skin by using multiple skin areas In the great majority of cases there is no further bleeding, but in a small proportion there may be one or even two further menstrual periods

Fibroids

The radiotherapeutic menopause ...
... ated with fibroids After cessat ...
... that they may be no longer pal ...
... eeding This method of treatme ...
... low the age of 40 years, or for sub ... patients
interstitial or subserous fibroids in patients aged 40 years or over when the ... It is suitable for the treatment

fibroids are of moderate size and without other complications The radiotherapeutic menopause is contra indicated in very large fibroids in excess of the size of a foetal head, in cases in which there are pressure symptoms and in which urgent relief of symptoms is required, in cases with a history of previous pelvic infection and those in which there may be any suspicion of degeneration or sarcomatous change in a fibroid

Endometriosis

In some cases of endometriosis causing symptoms such as rectal obstruction by an infiltrating mass, or periodic haematuria from an endometrial deposit in the bladder, the production of the menopause by radiotherapy may result in shrinkage of the mass and relief of symptoms

Carcinoma of the breast

Destruction of ovarian function by x-rays is frequently used in the treatment of carcinoma of the breast There is evidence that, following an artificial menopause, rapidly growing carcinoma in a young woman may become slower in its rate of growth and that skeletal metastases may regress temporarily when this has been done These effects are in some ways analogous to those produced by the treatment of carcinoma of the breast by oestrogens and androgens

Menorrhagia

X-ray treatment to the ovary has been used to produce a temporary menopause in young women suffering from severe menorrhagia There is evidence that in some cases following this and the resumption of apparently normal ovarian activity, successful pregnancies have occurred There is an increasing amount of evidence, however, to show that ovarian changes due to irradiation, which are less ... of foll cle destr ct on may st ll be of importance and lead to

ormi

dered

with extreme caution

THYROTOXICOSIS

Many series of cases have been published of successful treatment of thyrotoxicosis by x ray therapy, but this method of treatment has not attained great

oped telangiectasis and even epithelioma of the neck following prolonged courses of repeated suberythemal doses

Primary thyrotoxicosis

a definite sequence of progress following treatment At first there is a subjective improvement, the patients feel better and are less nervous This is followed by a gain in weight and at the same time there is a reduction in the basal metabolic rate

The pulse rate may remain raised and improved for several months and then rapidly return to normal The size of the thyroid may not appreciably diminish for many months after the symptoms have subsided, but gradually diminishes in successful cases to a normal impalpable gland

Secondary thyrotoxicosis

In secondary thyrotoxicosis when cardiac involvement is the most serious feature, radiotherapy, with its relatively slow effect, should not be used and preference should always be given to surgery

THERAPEUTIC DEPILATION

The depilatory effect of x rays is frequently used as a therapeutic measure Temporary depilation by means of a single dose is used in the treatment of ringworm of the head in children The fungus spores come away with the hairs when the hair follicle is emptied and, provided the area is kept clean and depilation is complete,

Temporary depilation may also be used for the treatment of sycosis of the beard

The dose necessary to produce permanent depilation, whether by a single dose or by a course of daily treatments is very close to that which will cause permanent atrophy and progressive damage to the skin There have been many tragedies resulting from the cosmetic treatment of superfluous hair by x rays Telangiectasis and dermal atrophy may lead to necrosis or cancer formation The treatment by x rays of superfluous hair or the treatment of sweat glands to check excessive secretion is never justified

CANCER AND ALLIED DISEASES

active substances and with various cyto lethal compounds and hormones

PURPOSE OF RADIOTHERAPY

The use of radiotherapy in malignant disease should be considered as having two separate and distinct objects One is to attempt the definite cure of certain suitable cases, or, failing cure, to produce restoration to health with increase in expectation of life The other is to palliate symptoms in incurable patients

These two objects are quite distinct and though they may frequently overlap there is a fundamental difference in the methods of attaining each, and in the

palliation with no chance of cure or of real prolongation of life it is obviously nc justifiable to give arduous treatments which may make the patient, even ten porarily, more uncomfortable When cure is attempted the radio sensitivity of th tumour is of fundamental importance both as regards the selection of cases and th technique to be used

CLASSIFICATION OF TUMOURS

Classification of tumours according to radio sensitivity has been carried out b Paterson (1948) and a similar classification by Cade (1948) The following is take *from Cade's book*

Group I *Highly Radio-sensitive Malignant Tumours*

Lymphosarcoma	Some parotid tumours
Lymphadenoma	Ewing s tumour of bone
Embryoma of the kidney (Wilms' *tumour)*	Multiple myeloma
Seminoma	*Medulloblastoma*
Chorion epithelioma	Lympho-epithelioma

Group II *Moderately Radio-sensitive Malignant Tumours*

Some lympho-epitheliomata	Squamous cell carcinoma
Rodent ulcer (untreated)	Some spheroidal cell carcinomata (breast)
Transitional cell carcinoma	Some adenocarcinomata (breast thyroid)

Group III *Radio-resistant Tumours*

Fibrosarcoma	*Some parotid tumours*
Osteogenic sarcoma	Teratoma
Adenocarcinoma of rectum	Some gliomata
Hypernephroma	Melanotic malignant tumours

HIGHLY RADIO-SENSITIVE TUMOURS

In the first group, highly radio sensitive tumours, x ray therapy is at present the principal method of treatment when the diagnosis has been established perhaps by exploration and biopsy

the percentage of permanent cures is small as, in addition to being highly radio sensitive, they are also highly malignant and give rise to early and widespread metastases

X ray therapy is chosen in preference to any form of radium therapy as it is necessary in most cases to treat large volumes of tissue and to include the areas where metastases are most likely to occur as well as the site of any primary lesion It is easier to treat the required areas and to obtain homogeneous dosage with x rays in these cases

In seminoma of the testis, surgery is used in the form of simple orchidectomy and x ray therapy is given to the areas of probable dissemination in the para aortic glands This method of treatment has caused a marked improvement over the results of surgery alone The radio sensitivity of this condition is such that even if *intrathoracic metastasis has occurred, x ray therapy* should still be given, and there are cases of lasting cure when the disease has spread to this extent In Wilms

tumour also surgery is combined with x ray therapy The kidney is removed after the tumour mass has been reduced by x rays provided that distant metastases have not already appeared

In cases of medulloblastoma a decompression has usually been carried out when the exploration is undertaken to establish the diagnosis The x ray treatment is planned to include the whole of the cerebrospinal tract as there is a likelihood of secondary growths being seeded down the spine or in the ventricles

Lymphadenoma has been included for convenience in this group of malignant tumours The clinical picture presented by this disease is variable and the value of x ray therapy differs according to the clinical picture and the rapidity of onset with a rapid febrile onset and Despite treatment to all the the disease may progress with little or no remission and the patient may die within 2 or 3 months

This picture is fortunately less common than that of a more chronic d sease

a total duration of life of a few months only despite any form of treatment and the chronic long standing cases

health and strength After a variable interval he is again treated for a further en

Not only superficial but more deeply seated glands in the abdomen and medias tinum become involved The spleen enlarges and the patient develops intermittent pyrexial attacks probably with involvement of the liver

with increasing cachexia fails to respond to any treatment

The main value of x ray therapy is to relieve the patient s symptoms and doubt has been expressed as to whether it does in fact bring about prolongation of life Of this there can be no doubt in many cases As an example a patient presenting himself with severe dyspnoea and signs of obstruction of the venae cavae from a large med astinal mass remained free from symptoms for 10 years following a single course of x ray treatment The use of nitrogen mustard has been tried as an alternative to x ray therapy particularly in cases with widespread involvement There have been many cases with dramatic immediate response but the relapses have been as soon or sooner than when x rays are used It is possible that a com bination of these two methods may be of value

MODERATELY RADIO-SENSITIVE TUMOURS

In the second group, moderately radio-sensitive tumours, are the majority of conditions which provide the highest proportions of lasting successes as the result of radiotherapy

In this group are the common skin cancers, basal-cell and squamous cell epithelioma, and also cancer of the cervix, of the tongue, mouth and lip, of the breast, of the larynx and of the maxillary antrum In almost all of them a careful evaluation of the clinical features, including size and extensions of the growth, involvement of bone or cartilage, and the presence of metastases, must be made before deciding whether radiotherapy or surgery or some combination of both should be used The method of radiotherapy, whether x rays or radium or even a combination of the two, as in carcinoma of the cervix, is frequently debatable in this group of cases There are some conditions, such as cancer of the anterior two thirds of the tongue, in which the technique of radium implantation has proved superior to x ray treatment In many other cases the choice between these two agents may depend on personal experience and training, and there may be no difference in the results achieved It is only possible to give a few examples In

then radical surgery, with removal of a portion of the jaw may be the only chance of effecting cure

Cancer of the breast, if confined to the breast, may be treated by radical mastectomy alone, but if axillary metastases are present, either pre operative or post operative x ray therapy may be used

In early cases of cancer of the larynx there does not seem to be much difference between the curative results of laryngo fissure, teleradium, x ray therapy, or the Finzi-Harmer method of radium insertion The functional results of teleradium and x ray therapy would appear to be superior, as the larynx may be restored practically to normal In more advanced lesions of the vocal cord there is a choice between teleradium or x rays and total laryngectomy In advanced growths of the larynx total laryngectomy gives the only hope of cure

RADIO-RESISTANT TUMOURS

In the third group, radio resistant tumours, x ray therapy has little, if any, part to play as a curative measure, but may be used, as in cases in the first two groups, as a palliative measure in advanced cases

The use of x ray therapy as a method of palliation in malignant disease is of great importance as there are still, unfortunately, many patients who first come for treatment when the condition is hopelessly advanced There are also many patients who develop recurrence after previous treatment by surgery or radiotherapy and have distressing symptoms such as pain and haemorrhage The value of palliative treatment may be overlooked in the effort to find the cause and cure of cancer It does not provide any lasting evidence of success, nor can the real benefit which it produces be measured by statistics

Treatment of Pain and Ulceration

pariah in the household

It may be used for the relief of pain, either to reduce a glandular mass cai pressure on nerves or oedema of a limb, or for the treatment of a vertebral r

prevent the onset of blindness

Treatment of the Leukaemias

The treatment by x rays of chronic myeloid and chronic lymphatic leukaen also classed as palliative, although by repeated treatments considerable prolc tion of life may be attained.

In chronic myeloid leukaemia treatment may be directed to the grossly enl: spleen In the previously untreated case, with small doses of x-rays there will rapid diminution in the white-cell count with disappearance of myeloblasts myelocytes At the same time there should be an increase in red cells and a crease of haemoglobin value. Treatment may be continued until the whit count is reduced to the level of about 20,000 per cubic millimetre or even sli lower There will probably be a rapid diminution in the size of the spleen with responding relief of abdominal discomfort. With improvement in the anaemi patient feels better and regains his energy. This remission of symptoms may la some months or for even more than a year, when a relapse will occur The treat of the first and subsequent relapses becomes increasingly difficult and, as in H kin's disease, the periods of remission become shorter. Finally the clinical pi of the disease may change to that of an acute leukaemia and the patient ra succumbs

In chronic lymphatic leukaemia treatment may be directed to a moderatel

of the disease may be longer There are patients with chronic lymphatic leuka who have been under treatment for 7 and 8 years, while it is rare to find patient with the myeloid type of the disease who has survived more than 4 year

The peripheral blood count is of great importance in following and assessin

relieve the patient's symptoms and to allow him to live a comfortable and u life It may be advisable, particularly in cases of chronic lymphatic leukae

when the disease has been under treatment for some time, to allow the white-cell count to remain at relatively high levels, provided the haemoglobin value is reasonably maintained and the patient feels reasonably well The presence of chronic lymphatic leukaemia may be an accidental finding during a routine examination of an elderly person If no symptoms exist there should be no hurry to institute any treatment

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INDEX